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BASIC TECHNIQUES IN MYRINGOPLASTY AND TYMPANOPLASTY.*

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The work of Wullstein¹ and Zollner² in the practical application of the technique of tympanoplasty has stimulated otologists throughout the world to become interested in this phase of rehabilitative surgery. Berthold in 1878, first closed a perforated ear drum successfully and reported several successful results. Eli,⁴ Tageman⁵ and Roosa,⁶ in America, tried the operation with questionable results. There was a definite cessation in the practice of tympanoplasty from 1900, until the reports of Wullstein and Zollner again focused attention on the procedure. Since their thorough studies and results were reported, it is a matter of history that the technique has been adopted enthusiastically, and modified to some extent by otologic surgeons everywhere.^{7,8,9}

We consider¹⁰ tympanic skin grafting to be the basic technique, and the five types of tympanoplasty to be modifications of this technique. These modifications depend upon the pathology found in the sound conduction mechanism, the ossicular chain, oval window and round window, as well as upon the pathology in the mastoid cavity. In all types, control of suppuration in the middle ear and mastoid, as well as main-

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tenance of an air space connecting the two mobile functioning windows to an adequately functioning Eustachian tube, is necessary. The middle ear must be lined with mucous membrane, and the cochlear reserve should be adequate for complete success of the procedure.

PREOPERATIVE PROCEDURES.

I.—Control of Suppuration.

Culture and sensitivity tests are obtained, and the patient is started on specific local and systemic antibiotics when available. Burrow's solution, gentian violet or 25 per cent argyrol solutions are used locally when the tests reveal the organism insensitive to specific antibiotics. To obtain better contact between drug and organism the secretions in the middle ear are aspirated at intervals of 48 to 72 hours, and the drug administered through a cannula directly into the involved area of the middle ear. This is done in addition to local administration of the drug several times daily by the patient. If a focus in the mastoid fails to resolve, a thorough simple mastoidectomy may be done. Except when cholesteatoma is present, these methods usually produce a dry ear. If radical mastoid surgery should be necessary, it should be as conservative as possible, especially with regard to saving the annulus, mucous membrane of the middle ear and Eustachian tube function. There is little to be gained from sacrificing these structures, and they are vital in surgical reconstruction of the middle ear and sound conduction mechanism by tympanoplastic techniques.

In order to create a patent Eustachian tube and prevent recurrent infection, an adenoidectomy and sinus, or allergic treatment, may be necessary.

II.—Test the Eustachian Tube Function.

Careful examination of the ear may rule out middle ear effusion and retraction pockets, and determine whether a middle ear air space is present. Politzerization, Valsalva maneuvers and catheterization and inflation of the Eustachian tube will be helpful. These procedures give valuable informa-

tion, but at present we do not have an absolute test of Eustachian tube function.

III.—Search for Presence of Cholesteatoma.

A meticulous examination is made for marginal perforations, squamous epithelium in the middle ear, or cholesteatomatous debris in the perforation. Magnification with the Zeiss operating microscope will be helpful in this study. Mastoid X-rays may be useful. If in doubt, exploration of the mastoid, epitympanic area and middle ear is done at time of surgery before skin grafting procedures are attempted.

IV.—Testing of Hearing Function:

1. Air conduction, bone conduction, speech reception threshold and discrimination tests are done routinely.

2. Patch test—when possible a paper patch is applied to the tympanic perforation to close the opening temporarily, and an air conduction test is made with the patch in place. When the patch can be applied successfully and a complete seal occurs in all areas around the periphery of the perforation, valuable information concerning the integrity and function of the ossicular chain may be obtained. If closing the perforation with a paper patch increases hearing appreciably, the ossicular chain is presumably intact.

3. Acoustic Probe—In those cases when it is not possible to apply a patch successfully because of the size of the defect in the drum, the acoustic probe is used to determine the efficiency of the ossicular chain. In the presence of cholesteatoma the acoustic probe test results may not be reliable, because it is possible for the cholesteatomatous mass to act as a conducting mechanism between the parts of a disrupted chain. The results may indicate that the chain is intact and functioning, but an obvious defect in the chain may be apparent following removal of the cholesteatoma, especially in the area of the incus.

TECHNIQUE OF MYRINGOPLASTY.

Special Problems Associated with Tympanic Skin Grafting.
The successful take of the graft while bridging an air-

containing cavity (the middle ear), is an important problem in this type of skin grafting. The bed for this graft lies peripherally, formed by denuding the tympanic remnant, the annulus, and often the adjacent canal wall, of squamous epithelium. These skin grafts differ from the usual skin graft in that their central portion, which overlies the defect, is not in direct contact with any blood supply.

Most authorities agree that the permanent blood supply of a graft occurs when endothelial vascular buds grow from the bed blood vessels out into the graft and make continuity with the graft blood vessels between the fourth to tenth postoperative day. Paget¹¹ and Conway¹² feel that most skin grafts survive the first few days on a plasmic circulation diffusing extra-cellularly from the bed blood vessels up into the graft. We have previously reported our belief that this type of circulation could nourish only that portion of the graft which lies directly adjacent to the bed, and we believe that some primitive type of intravascular circulation nourishes the central portion of the graft soon after its application to the bed. We believe that an intravascular circulation begins within 24 hours through the matching of the many severed ends of the capillaries in the graft with the numerous capillary endings in the denuded vascular bed. Thus an early intravascular circulation occurs through the parallel sub-epithelial vascular network into all portions of the graft. A tympanic skin graft must be cut thick enough to include the network of blood vessels running parallel to the skin surface.

In general, there are two such networks: a superficial one running just below the dermal papillae; and a deep one lying in the middle of the dermis. These vascular networks have rich anastomoses. A thin split thickness graft may contain none of this parallel blood supply, and the central portion of the graft would probably slough. The full thickness graft and the three-fourths thickness split graft contain both the superficial and deep vascular networks and are better suited for tympanic skin grafting. We prefer the three-fourths thickness skin graft, as it is not necessary to clean the fat from the under surface of the graft, and possible trauma to the graft's blood vessels is avoided.

Only gentle pressure should be used in packing the graft in place. Pressure of greater than 10 cm. of water may collapse the capillaries in the graft and cause a slough of the central portion of the graft.

We have previously reported other factors which we believe are important in successful tympanic skin grafting.

I. Absence of Infection: To guard against latent infection, surgery should be postponed until the ear has been perfectly dry for at least 30 days. We recommend pre- and postoperative antibiotics, sterile surgical preparation, sterile operating room technique and sterile postoperative care in office dressings. A two-stage operation may be necessary, with the first eradicating the infection, and the second repairing the middle ear defect after the infection is completely controlled.

II. Good Exposure of the Entire Tympanic Remnant and Annulus: This is a vital factor in the success of the procedure done through the transmeatal route and can be an important factor in the conventional endaural approach as well. Occasionally the transmeatal procedure can be done through the intact ear canal, but a modified endaural and anterior U-shaped incision is usually required, and enlargement of the bony canal may be necessary.

The bed must be completely denuded of every vestige of squamous epithelium, and the graft must be placed in close apposition to the bed with an adequate overlap. Binocular magnified vision of all surfaces is required, and the anterior sulcus formed by the tympanic remnant and the anterior canal wall at the annulus is the most difficult to visualize properly. In the transmeatal approach, it should be remembered that the visibility is never so good as it appears to be at the beginning of the operation.

III. Atraumatic Preparation of the Vascular Bed and Handling of the Skin Graft: The graft and the bed should be prepared with only the sharpest instruments. They should not be allowed to dry, and the graft should not be washed in normal saline or other so-called physiologic solutions, which may be injurious to the graft. Crushing of the graft with scissors or forceps should be avoided.

IV. Regrafting: If the primary graft fails because of slough, it is well to regraft as soon as the failure is discovered. The first graft invariably stimulates the vascularity of the bed, and the second graft is more likely to succeed than the first if repeated within the first three or four months.

TECHNIQUE OF MYRINGOPLASTY.

Type I—Tympanoplasty. Anesthesia is obtained by injection of 2 per cent xylocaine with 1:50,000 adrenalin in

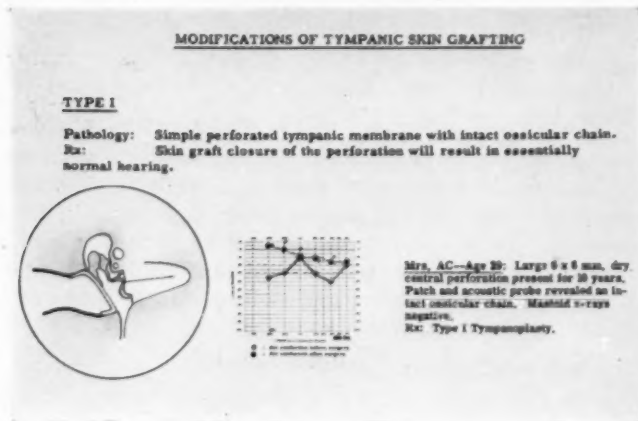


Fig. 1.

the postauricular sulcus and mastoid area. At the osteo-cartilaginous junction in the canal, and along the roof of the canal, 1:5000 adrenalin is used in the xylocaine for hemostasis. In some individuals supplementary general anesthesia in the form of intravenous pentothal is advisable (see Fig. 1).

A modified endaural incision is made (see Fig. 2) and the first incision is carried along the roof of the canal to a point 2 mm. from the drum. A second incision is then made across the posterior wall of the canal parallel, and 2 to 3 mm. lateral to the annulus. It extends as far as the junction of the floor of the canal with the posterior wall. A third incision is then



Fig. 2.

made from the inferior end of the second incision laterally to the osteo-cartilaginous junction. The skin flap outlined on the posterior canal wall by these incisions is then elevated laterally. After partial elevation of the periosteum over the mastoid process, the posterior canal flap is tucked between the overlying soft tissue and the mastoid process, to be replaced in the canal at the end of the operation. A self-retaining retractor is inserted, leaving both hands free for instrumentation. A U-shaped flap is now cut from the skin of the anterior

canal wall (see Figs. 3, 4). The lower portion of the U extends across the canal parallel to, and approximately 3 mm. lateral to the annulus. The vertical portion of the U falls into the junction of the roof of the canal with the anterior wall and the junction of the floor with the anterior wall respectively. The vertical incisions extend to the osteo-cartilaginous junction on



Fig. 3.

the anterior wall. The anterior flap is then elevated and rolled up onto the skin of the anterior cartilaginous level, to be replaced at the end of the operation. The overhanging bone of the anterior canal wall is thinned with a sharp mastoid curette until the anterior sulcus can be well visualized.

The graft bed is prepared by removing the outer layer of

squamous epithelium from the rim of the drum and adjacent canal wall with specially made tympanic membrane curettes. Occasionally a sharp knife is used to trim the cuff from the inside of the perforation which is formed by the junction of the squamous epithelium with the mucous membrane from the undersurface of the drum. After denuding the fibrous layer,

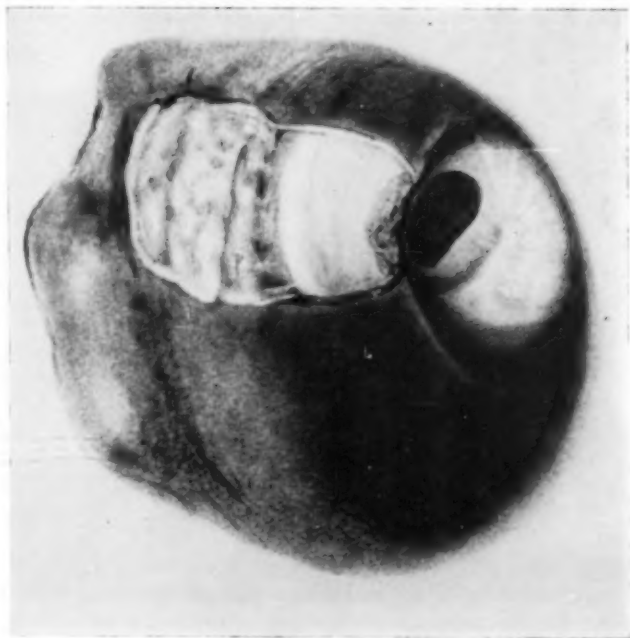


Fig. 4.

the perforation is measured with a fenestrometer. An appropriately sized three-fourths split thickness graft is then cut with a "Weck" razor blade from the non-hair bearing skin over the mastoid. The graft is placed raw surface up on a tongue blade and cut to measure with a scalpel, so that it overlaps the perforation 2 to 4 mm. in all directions save

posteriorly, where it overlaps 4 to 6 mm. The graft is placed in position on the tympanic remnant, and all edges are everted with sharp picks. It is then pushed into contact with the drum and anterior sulcus with a wire ring curette. The graft is then covered with small strips of cigarette paper, and one-sixteenth-inch cotton balls are gently placed against the annulus and over the central portion of the graft. The anterior and posterior skin flaps are now rolled back into place, covered with cigarette paper strips, and the remainder

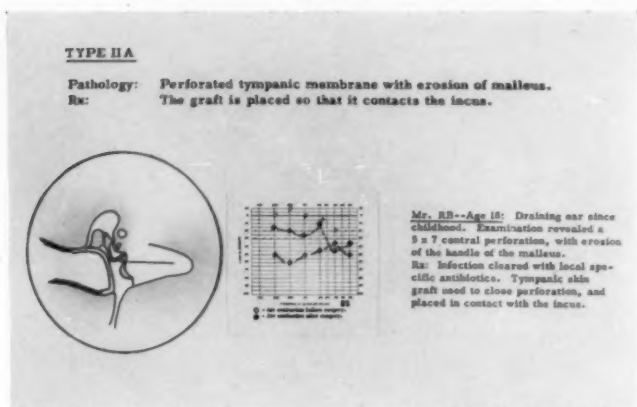


Fig. 5.

of the canal filled with antibiotic ointment impregnated cotton balls. The incision along the roof is protected by a strip of surgical rayon, and the small external incision is closed with silk. The donor site is covered with antibiotic ointment impregnated rayon and a mastoid dressing is applied.

The patient is maintained on an appropriate antibiotic for 24 hours preoperatively, and seven days postoperatively. The packs are removed on the seventh day, and the cigarette papers wiped out on the 14th day. The mastoid dressing is removed after 48 hours and a small dressing applied over the rayon on the donor site, which is usually healed in 10 days.

MODIFICATIONS OF TYMPANIC SKIN GRAFTING.

The Type I technique has been described. We have divided the Wullstein Type II into A and B classifications (see Fig. 5).

Type II-A. Pathology—a perforated tympanic membrane with erosion of the long process of the malleus and an otherwise intact ossicular chain.

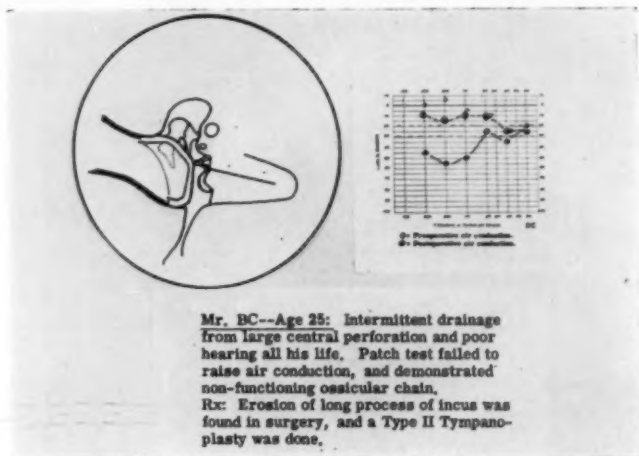


Fig. 6.

Technique—the graft is placed so as to contact the long process of the incus, thereby transmitting its vibrations directly to the incudostapedial joint.

Type II-B. (See Fig. 6). Pathology—necrosis of the long process of the incus is present with loss of the true incudostapedial joint. Fibrous adhesions across the defect between the shortened incus and stapes head do not act as a satisfactory incudostapedial joint in the transmission of sound impulses. The accepted procedure in this situation has been to remove the ossicles in conjunction with a radical mastoidectomy and do a Wullstein Type III tympanoplasty. In the ab-

sence of cholesteatoma we have found that this type of pathology can often be handled by modification of Wullstein's Type II tympanoplasty. This technique has the following advantages:

1. It can often be done directly through the external auditory canal as in myringoplasty or Type I tympanoplasty. If the status of the mastoid is unsure, exploration of the mastoid,

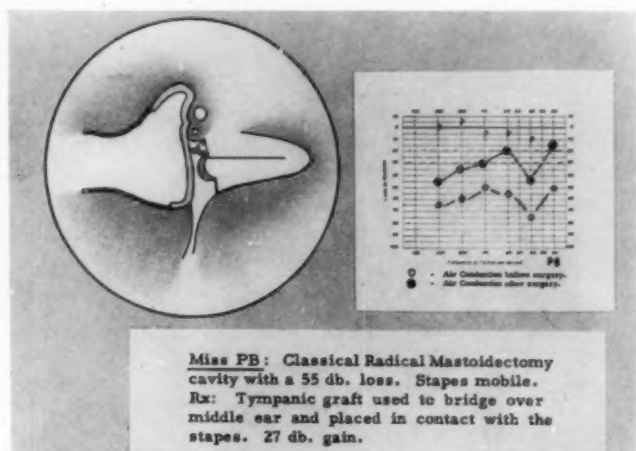


Fig. 7.

including the epitympanum may be done, leaving the bony external auditory canal intact. If the epitympanum is free of disease, it is often unnecessary to remove the incus.

2. It insures an adequate air space in the stapes area of the middle ear, allowing free mobility of the new tympanic membrane and stapes.

3 Improvement of hearing may be greater than the average Type III tympanoplasty result.

4. It may avoid the inherent disadvantages of a radical mastoid cavity; however, this technique may be applied when

a modified radical mastoidectomy is necessary, if a small portion of the bridge is left intact.

Technique—the denuded tympanic remnant is raised from the annular sulcus posteriorly, and the incudostapedial joint area is exposed by wide removal of bone in the annular area. At this time the round window area may be inspected and mobility of the stapes determined.

When the graft is applied the denuded remnant of the drum and graft are depressed and packed lightly in place so as to contact the shortened long process of the incus, as well as the head of the stapes; thus the graft bridges from the annulus anteriorly to the malleus, to the incus and stapes, and back onto the posterior wall of the canal.

Type III. Pathology—Destruction of the ossicular chain is present, usually due to erosion by cholesteatoma. The stapes is intact and is mobile or may be mobilized. There is loss of the posterior and superior canal wall, because a radical mastoidectomy is necessary or has been done previously. The annulus has been preserved and the Eustachian tube is functioning.

Technique—all pathological processes are removed from the middle ear and mastoid. The round and oval windows, including stapes mobility, are investigated. A tympanic skin graft is applied so that it bridges from the tympanic remnant or annulus to the floor of the attic and facial ridge. The graft is packed gently into contact with the head of the stapes in order that vibrations are transmitted directly to the stapes, affording a columella effect, similar to the middle ear conductive mechanism in the bird's ear.

Type IV. Pathology—Destructive processes similar to Type III except that the crura of the stapes are missing, the footplate is mobile, or a mobile oval window membrane is present.

Technique—round window protection is achieved by bridging the skin graft from the annulus to the promontory, leaving the oval window exposed to direct vibration of sound.

Type V. Pathology—In addition to the pathological changes

found in Types III and IV, the oval window is nonfunctional because of irreversible fixation of the stapes, or fibrosis.

Technique—after fenestration of the lateral semicircular canal, the tympanic graft is applied to bridge across the middle ear space onto the floor of the attic, covering the fenestra in the lateral semicircular canal.

SUMMARY.

1. The general principles and basic techniques of tympanic skin grafting have been described.
2. The modifications of this basic technique into the five types of tympanoplasty have been discussed.
3. Preliminary preoperative procedures, including selection of patients for tympanoplasty, have been described.

ANNUAL OTOLARYNGOLOGIC ASSEMBLY UNIVERSITY OF ILLINOIS.

The University of Illinois College of Medicine Department of Otolaryngology announces its Annual Otolaryngologic Assembly from September 29 through October 5, 1958. The Assembly will consist of an intensive series of lectures and panels concerning advancements in otolaryngology, and evening sessions devoted to surgical anatomy of the head and neck and histopathology of the ear, nose and throat. Interested physicians should write direct to the Department of Otolaryngology, 1853 West Polk Street, Chicago 12, Ill.

PRELIMINARY REPORT ON THE PATHOGENESIS OF
DERMATOSES OF THE EXTERNAL
AUDITORY CANAL.

Twenty Cases of Acute Diffuse External Otitis,
Due to Deep Infections.*†

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External otitis has always been a subject of particular interest to otologists, and more recently, to dermatologists. During recent years many excellent investigative studies have been reported; yet only a casual survey quickly reveals that more are indicated and needed.

As previous investigators have pointed out, the term "external otitis" embraces a variety of diseases that have little in common other than that they occur in the external ear. Since the external ear, auricle and canal, is entirely covered by skin, these diseases must basically be designated dermatoses. It is natural that otologists are primarily interested in the acute infections of the canal, and that dermatologists are primarily interested in other dermatoses of the auricle. Geographical location and climate, more specifically, temperature, humidity, and exposure, are important factors. Our Southern otologists annually see many cases of acute diffuse external otitis and furunculosis with a sharp rise in the case load shortly after the opening of the swimming season, and

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this experience is reflected in their studies and reports; our Northern colleagues in drier, cooler climates see fewer of these cases, and are more concerned with the other dermatoses.

Reviews and discussions of the subject are hampered by the lack of a simple classification that is definite, clearly understood and generally accepted. Senturia³ published a detailed classification in his book, "Diseases of the External Ear," yet his introduction of it indicated he was not entirely satisfied with it, and it could hardly be called simple.

For the purpose of this presentation we will employ the following etiologic classification:

Acute Diffuse External Otitis:

I. Dermatoses due to infection

A. Superficial—1. Bacterial; 2. Viral; 3. Fungal.

B. Deep—1. Bacterial; 2. Viral; 3. Fungal.

II. Other dermatoses.

Our presentation will be confined to those cases due to deep bacterial infections. We consider furunculosis a progressive development and accompaniment of acute diffuse external otitis, due to furuncle-forming bacteria. These cases are the result of Gram-positive bacterial infections; Gram-negative infections are usually superficial.

Our interest in this phase of this subject was aroused by Sophian and Senturia's⁴ detailed report of five biopsies of acute diffuse external otitis. They commented on finding dilatation of the capillary and arteriolar vessels, endothelial swelling, hyperplasia and sometimes thrombosis and necrosis, noting that these vascular reactions are usually associated with toxic or allergic reactions rather than with pyogenic infections. Further they noted a high eosinophilia (average 24 per cent) in the inflammatory exudate in the tissues. While they pointed out that their findings did not necessarily indicate that the inflammatory process was allergic, they recognized that "certain clinical and pathological aspects—were—compatible with a state of sensitization."

One of us has studied allergy for the past 30 years and is keenly aware of the importance of allergy in otolaryngology, but could not accept such findings as typical of acute diffuse external otitis. Although the usual data were presented they did not include any history or indication as to whether those patients had an allergic background, whether they had been given previous local treatment that could have caused a complicating contact dermatitis, nor did they include any bacteriologic, cytologic or hematologic studies.

Our search of the literature at that time failed to reveal any other report of biopsies of cases of acute diffuse external otitis. Later Shelly and Perry² published an interesting investigative study on the experimental production of external otitis, reporting over 70 biopsies. Obviously, we cannot use them for direct comparison with our material.

In 1956 we studied biopsies and white blood counts of three cases of acute diffuse external otitis, one complicated with furuncle formation (previously briefly reported¹ but included in this study). These findings were quite different from those reported by Sophian and Senturia,⁴ and prompted us to continue our studies in this field.

MATERIALS AND METHODS.

To date we have studied biopsies of 27 cases. We do not have complete data on all of these but can fully report 20 cases, 12 of which were complicated with furunculosis. One patient was seen in the University Out-Patient Clinic, but the other 19 were private cases. Insofar as possible they were taken consecutively, as they presented themselves, excepting only young children, unusually apprehensive patients, and those who came in at the very end of the office hours. The biopsies were taken with the patients' knowledge and permission. Approximately 0.5 ml. of 2 per cent xylocaine with 1:50,000 epinephrine was slowly injected 3 to 5 mm. anteriorly to the chosen site; after five minutes an elliptical V-shaped section, 2 or 3 mm. wide, and 4 to 6 mm. long and extending down to the cartilage, was removed. The specimen was fixed in 10 per cent formalin; sections 5 micron thick were made,

Case Number	Race	Sex	Age	White Blood Count							Furuncle	Month	Pathological Studies (Estimates)				
				Total	Segs.	Bands	Lymphs.	Monos.	Bas.	Eos.			Segs.	Monos. related in tissues	Eos.	Severity of Inflammation	
1.	56-67	W	M	45	16,700	70	10	10	6	1	3		Aug.	20	80	1	Moderate
2.	56-68	C	M	15	18,300	60	10	25	5	-	-		Aug.	50	50	1	Moderate
3.	56-69	W	M	12	7,700	49	7	29	11	1	9	X	Aug.	75	25	10-15	Moderate
4.	56-184	W	F	28	8,400	60	-	32	2	-	6		Sept.	40	60	10-15	Moderate to severe
5.	56-185	C	F	45	10,100	58	-	59	3	-	-	X	Nov.	75	25	0-1	Moderate to severe
6.	57-36	W	M	58	9,800	61	2	23	4	-	10		Nov.	50	50	2-5	Slight to moderate
7.	57-96	W	F	30	11,800	69	8	21	1	-	1	X	Jan.	60	40	0-1	Moderate
8.	57-97	W	F	67	8,400	59	-	35	2	-	4	X	Dec.	90	10	0-1	Moderate
9.	57-106	W	M	22	10,200	66	-	26	1	-	7		May	50	50	0-1	Slight
10.	57-107	C	F	23	9,600	61	-	36	2	-	1	X	May	75	25	1	Severe
11.	57-109	C	F	26	10,600	69	-	27	1	-	3	X	Apr.	75	25	1	Slight to moderate
12.	57-111	W	F	40	10,900	63	8	24	2	-	3	X	Feb.	80	20	0-2	Moderate to severe
13.	57-129	W	M	19	11,300	52	6	30	4	-	8	X	July	75	25	0-1	Severe
14.	57-131	W	F	23	19,400	55	12	29	-	-	3		July	30	70	0	Slight
15.	57-132	W	M	25	14,700	54	9	31	3	-	3	X	July	50	50	0-1	Severe
16.	57-133	W	M	34	15,500	68	11	12	5	-	4		July	80	20	0	Moderate
17.	57-134	W	M	16	10,900	42	16	29	6	-	7	X	July	75	25	1-3	Severe
18.	57-135	C	F	16	16,700	56	5	37	-	-	2	X	July	50	50	0-1	Slight to moderate
19.	57-136	W	M	13	12,800	79	6	14	1	-	-	X	July	80	20	0	Severe
20.	57-137	W	F	22	9,300	48	9	34	2	1	6		July	75	25	0	Moderate

Chart 1.

some semiseriably. Slides of all cases were routinely stained with hematoxylin and eosin, but slides from six biopsies also were stained by Giemsa's technique and MacCallum's modification of Goodpasture's Gram's stain. A total and differential white blood count was routinely made on each patient.

A statistical analysis of these cases reveals their ages ran from 12 to 67; younger patients were purposely not included. Only 25 per cent were in the colored race, which confirms previous observations by other otologists. The incidence in sexes was identical, but it is interesting to note that the seven cases following swimming were all males, five in their 'teens;

CHART 2.

	Total	Race		Sex		Age					
		W	C	M	F	11-20	21-30	31-40	41-50	51-60	61-70
Incidence of Cases.....	20	15	5	10	10	6	9	1	2	1	1
Cases Following											
Swimming	7	6	1	7	....	5	1	....	1	....	....
History of Pruritus or											
Previous Involvement	8	6	2	1	7	....	3	1	2	....	1
History of Trauma											
"Picking Ear"	2	2	....	1	1	....	1	....	....	1	....
Furuncle Noted	12	8	4	5	7	5	4	1	1	....	1

while seven of the eight who gave a history of previous involvement were females. Furuncle formation was noted at the time of first examination in 12 of the 20 cases; eight of the 15 whites, and four of the colored. Oddly enough, a history of trauma was obtained in only two cases, both white adults, one male and one female. Almost one-half were patients in their third decade, but there was at least one in each of the second, fourth, fifth, sixth and seventh decades. Patients were seen in every season and almost every month, with more than one-half in July and August.

PATHOLOGIC STUDIES OF BIOPSIES.

Histologic Characteristics of the Inflammatory Reaction.

The degree of the inflammatory reaction, as determined by the number of inflammatory cells and the basic alterations of

the tissues, varied with different patients, but for the most part was moderately severe (see Fig. 1). Although round cells (mostly lymphocytes) were predominant in three patients, the usual situation was a great preponderance of polymorphonuclear leukocytes (see Fig. 2). These cells usually infiltrated most areas of the biopsy specimens diffusely, but

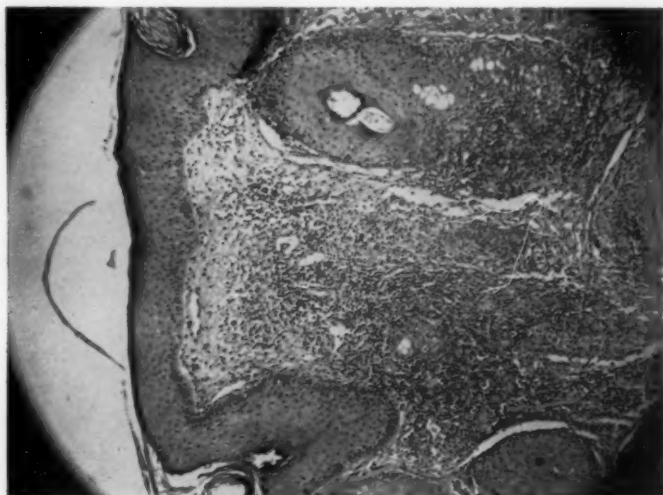


Fig. 1. (E-56-67) Moderately severe inflammatory reaction in connective tissue under epidermis and around hair follicles and sebaceous glands. Only a few inflammatory cells are seen in the epithelium and there is moderate parakeratosis. Hematoxylin and eosin stain, X-60.

in some locations they were more concentrated, occasionally around skin appendages. There was no perivascular collection of the inflammatory cells.

Eosinophils were scarce in most of the tissue sections, but in two patients these cells were significantly increased. When present, the eosinophils were found throughout the inflammatory reactions.

Focal tissue destruction in the dermis, with infiltration of solid sheets of neutrophilic leukocytes, was present in several

patients (see Fig. 3). These furuncles were relatively small and were surrounded by inflammatory cells of the type seen in other areas of the tissue in that patient. A few eosinophils were present in the exudate within the furuncles in biopsy material in which those cells were present elsewhere.

Gram-positive bacteria in clumps (see Fig. 4), morphologically similar to staphylococci, were found deep in the tis-

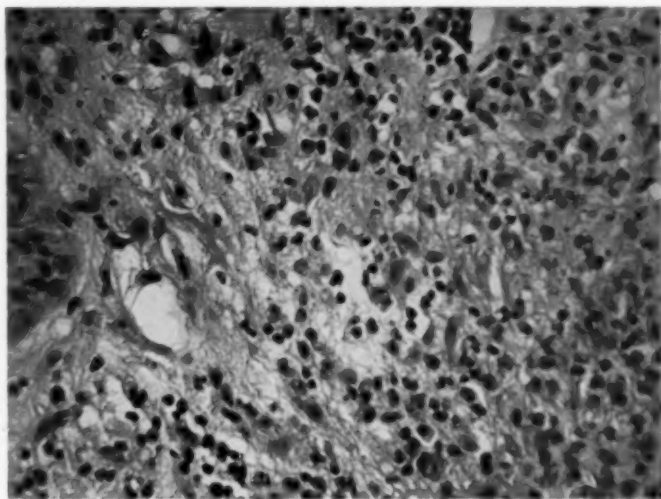


Fig. 2. (E-56-67) Polymorphonuclear inflammatory cells in tissue illustrated by Fig. 1. Hematoxylin and eosin stain, X-330.

sue from two patients. Similar bacteria were present in detached keratin and cellular debris in one of these biopsies and two others.

Infiltration of the epidermis was limited to neutrophilic leukocytes and an occasional eosinophil, noted in areas of spongiosis and vesiculation (see Fig. 5), or rarely within hair follicles (see Fig. 6), giving the appearance of microabscesses within the epidermis; these cells also were noted in the most superficial keratin layer and in fragments of keratin debris.

The material from one patient was characterized by the presence of many large multinucleated giant cells of the type commonly seen with foreign bodies. Many cells of varied type were seen around these giant cells.

Epidermis.

In most of the sections there was a slight thickening of the epidermis, with some hyperkeratosis, parakeratosis, and slight

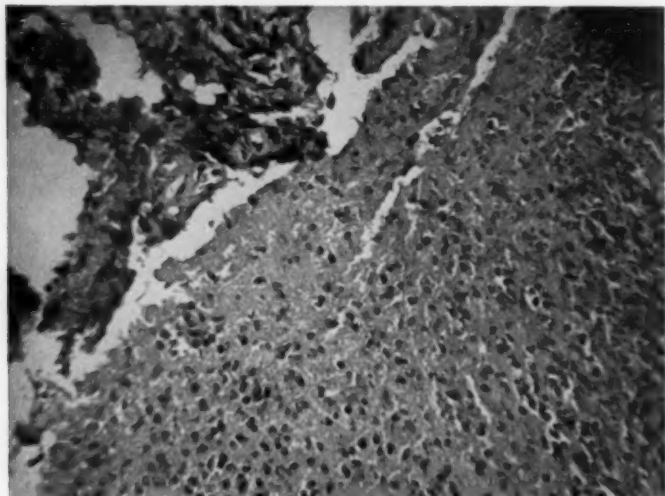


Fig. 3. (E-57-111) Purulent exudate present in a furuncle. Hematoxylin and eosin stain, X-230.

hyperplasia of the basal layer. Elongation of the rete pegs of a mild degree was commonly present. Spongiosis (edema) of the epidermis was frequent, being absent completely in only three patients. Vesiculation of varying degree was often present and, as expected, appeared to be a progression from the severe stage of spongiosis (see Fig. 5). As noted previously, neutrophils and a few eosinophils were in these areas. Microabscesses (see Fig. 6), appearing to result from intra-follicular inflammation and quite different from the vesicula-

tion, were seen rarely. Degeneration of the epidermis and neutrophilic infiltration were present over the furuncles. Follicular hyperkeratosis was present to some extent in all of the tissue except that from one patient.

Skin Appendages.

In general the hair follicles shared the changes of the epidermis, though to a lesser degree. Spongiosis and vesiculation

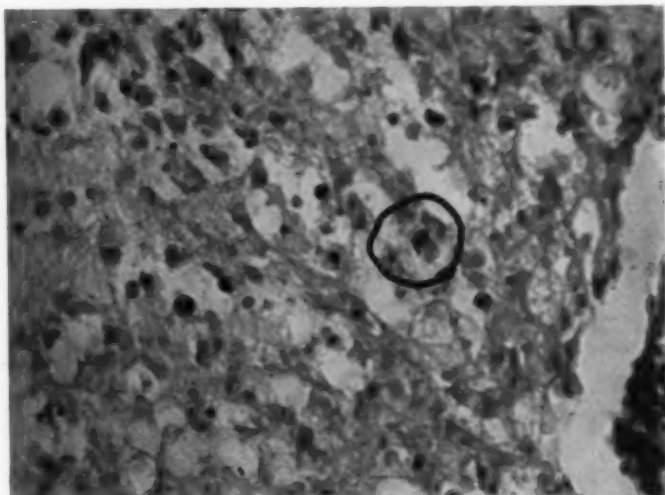


Fig. 4. (E-56-185) Small clump of gram-positive cocci (upper center), deep in skin of ear. Gram's stain, X-450.

were prominent in material from some patients and the inflammatory exudate of the dermis was occasionally concentrated about the hair follicles. Neutrophils, and rarely eosinophils, were present in the areas of spongiosis and vesiculation. Microabscesses within follicles have been described above.

The apocrine (ceruminous-producing) glands varied in the height of their epithelium, consistent with known variation due to secretory activity. In the vicinity of the most severe inflammatory reactions the glandular epithelium was distort-

ed, and inflammatory cells, usually only a small number, were present within the epithelium and the lumens. The glands were badly damaged or destroyed occasionally in the vicinity of the most severe inflammation (see Fig. 7). Dilatation of the ducts either was not present or was slight.

Inflammatory cells in and around the sebaceous glands were sparse. Retention of sebum was present to a slight degree in some glands.

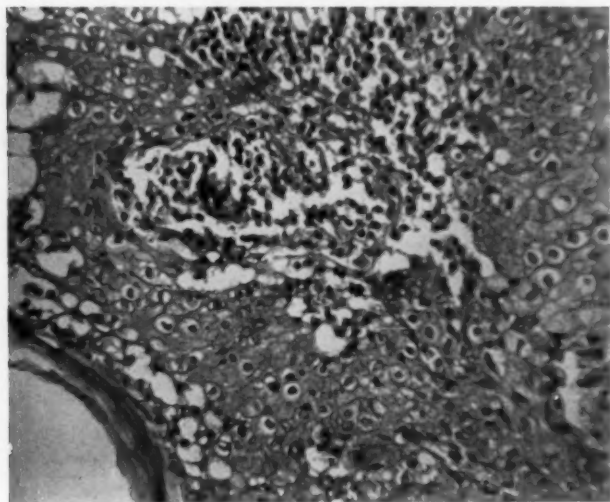


Fig. 5. (E-57-136) Polymorphonuclear leukocytes in areas of spongiosis and vesiculation. Hematoxylin and eosin stain, X-230.

Dermis.

The general inflammatory reaction in the dermis has been described above. This was accompanied by some degree of edema in most of the material, most prominent in the upper dermis. Brown pigment which gave a negative reaction to the iron stain was present in material from two patients.

Dilatation of blood vessels was noted, especially in the

upper dermis. Endothelial swelling was prominent, varying in severity with the amount of inflammation present. In some vessels the lumen was narrowed by the swollen endothelial cells. No vascular thrombi were noted; necrosis of blood vessels was also absent.

HEMATOLOGIC CORRELATION.

A scattergram plotting the total white counts of the peripheral blood against the percentage of neutrophils in the

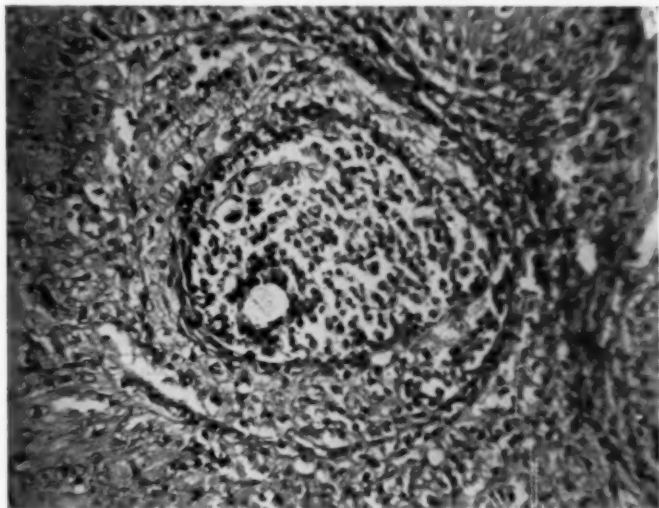


Fig. 6. (E-57-136) Leukocytic infiltration of polymorphonuclear type in hair follicle. Hematoxylin and eosin stain, X-230.

tissues reveals a fairly consistent finding of more than 50 per cent segmented cells in the tissues when the total count was over 10,000. A second scattergram plotting the percentage of eosinophils in the peripheral blood against the percentage of eosinophils seen in the tissues failed to reveal any correlation; comparatively few eosinophils were noted in the tissues, regardless of the percentage found in the peripheral blood.

DISCUSSION.

The inflammatory reaction present in these patients differed from that described by Sophian and Senturia⁴ in that there was significant tissue eosinophilia in only two specimens. Furuncle formation, conspicuous in our material, was not described in their studies. Sophian and Senturia also described vascular necrosis and thrombosis; neither of these

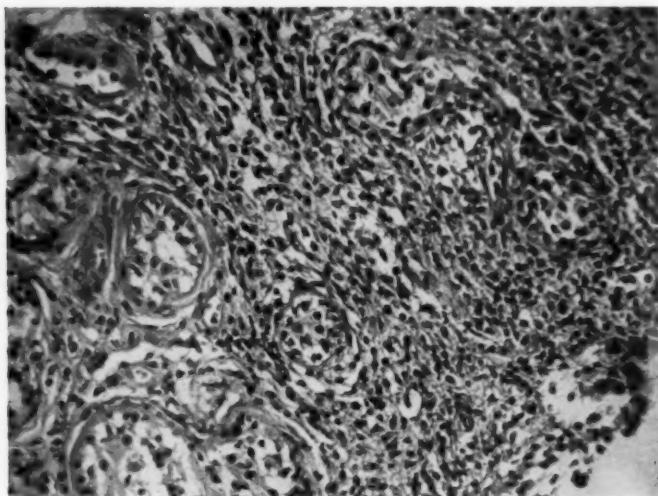
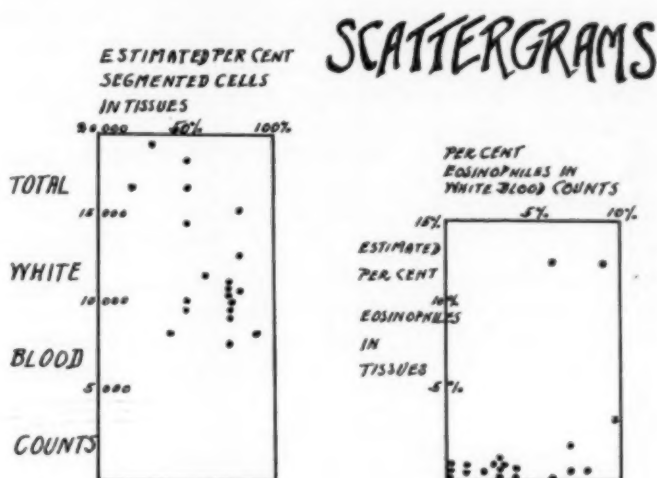


Fig. 7. (E-57-107) Severe inflammatory reaction in and around apocrine glands. Hematoxylin and eosin stain, X-230.

changes was present in our material. With the exception of tissue eosinophilia in two cases there was nothing in the histologic features of the inflammatory processes studied by us to suggest a hypersensitivity mechanism. On the contrary, the features in general are those one would expect to find in an infectious process, with localization and furuncle formation in specimens from some patients. It is possible that in the two patients in whom there was tissue eosinophilia the basic changes were produced by hypersensitivity, with a com-

plicating infectious process. One of these patients had a definite furuncle.

Shelley and Perry,² in an experimental study of the effect of various materials on the human external ear, described spongiosis and vesiculation of follicles as characteristic of a low grade contact dermatitis, produced by a 1:100 acetone solution of 3-n-Penta Decyl-catechol; however, they also noted



a similar change in the skin of ears treated with an irritant, 2 to 4 per cent formalin. The follicular alterations described in those experiments were similar to the spongiosis and vesiculation present in the follicles of our material; in our studies, however, these changes were even more pronounced in the epidermis proper. In view of the fact that spongiosis and vesiculation were produced by entirely different chemicals in their studies, and are present in a variety of skin diseases, it seems unlikely that these follicular or epidermal changes are a specific characteristic of allergic disease of the external ear.

CHART 3.
Vicksburg, Mississippi—Ground Elevation Above Sea Level—234 Feet.

Year and Month	1956					1957					Average	
	A	S	O	N	D	J	F	M	A	M	J	Total
Relative Humidity	59	57	55	55	64	68	62	55	55	57	61	59
Average Temperature	82.3	75.4	68.9	55.2	56.9	49.1	57.8	56.5	67.0	73.6	79.1	67
Incidence of Cases	3	1	....	2	1	1	1	....	1	2	....	20
Following Swimming	3	....	....	....	....	....	....	....	....	....	....	7
With Furuncles	1	....	....	1	1	1	1	....	1	1	....	12

Statistics on humidity and temperature obtained through the courtesy of Mr. Ernest Sherrill, Meteorologist, Weather Bureau, Vicksburg.

The one biopsy specimen of the present study in which a giant cell reaction was present is of interest. It seems likely that they resulted from damage to sebaceous glands with loss of sebum into the tissue. Although no foreign material could be demonstrated, it is possible that an unknown material had been introduced into the tissues of the ear.

Humidity, temperature and swimming are currently considered important factors in the production of this type of external otitis, and these studies may add some support to this opinion. The relative humidity is rather high in this area throughout the year and does not vary greatly; while there is no direct relationship between high humidity and incidence of cases, the constant high humidity may explain the incidence of cases during the Winter months. Apparently higher temperatures in Summer had no influence other than to encourage swimming but, again, the average temperature in this area is comparatively high. The incidence following swimming is obvious.

The occurrence of furunculosis throughout the year adds support to our opinion that furunculosis is a stage in the inflammatory process of acute diffuse external otitis due to or complicated with infection by furuncle-forming bacteria.

CONCLUSION.

We have presented detailed studies of the pathologic findings in 20 cases of acute diffuse external otitis due to infection, 12 of which were clinically complicated with furunculosis, and have correlated them with total and differential white blood counts.

These studies have been interesting to us, but we do not consider them final in any sense. The obvious differences between our findings and those of Sophian and Senturia,⁴ and the known influence of temperature, humidity and exposure, adds support to the theory that the clinical picture of this type of acute diffuse external otitis may be varied in different geographical areas and climates. We feel that studies from other areas are indicated, and hope that other

otologists and pathologists will join us in continuing these investigations.

Our appreciation is extended to Mr. John Dickson, Chief, Department of Medical Illustration, University of Mississippi Medical Center, for the microphotographs used in this paper

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**PATHOLOGY OF THREE HUNDRED CLINICALLY
BENIGN LESIONS OF THE VOCAL CORDS.***

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and

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The survey of this group of patients was prompted by Salinger's provocative article, published in *THE LARYNGOSCOPE* in 1956, pertaining mainly to the nomenclature of benign tumors of the larynx. From the material accumulated, and the information available in the articles mentioned in the bibliography,^{2,3,9} we have made an attempt to clarify our thinking in regard to the classification of abnormal but benign changes in the tissues of the vocal cords. As will be seen, it is evident that the results of the survey will be of benefit to us, and perhaps may be of interest to others.

We decided to study 300 consecutive cases (May, 1949, through May, 1957, an eight-year period), in which material was removed from the vocal cord for therapeutic and diagnostic reasons. The laryngoscopies and excisions of tissue were performed by members of the Department of Otolaryngology, of the University of Virginia Hospital, except in two instances (tissue referred by otolaryngologists in neighboring cities); and all the material was examined by the members of the Department of Pathology of this institution. A number of individuals participated in the above procedures, and this is one of the reasons for the confusion that was apparent in the presentation of the material to the pathologists and in the reporting of the results of their examinations.

As will be noted, the survey was initiated by first review-

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ing the various interpretations of the tissues, as reported by the first pathologists, who were the ones designated to be the examiners of all the routine specimens received by the Department of Pathology at that particular time. Consequently, the material was analyzed by many different pathologists of varying grades of experience in studying laryngeal structures. It was shown, also, that this group seldom received an adequate clinical description of the section to be examined. In the majority of cases the pathologist was aware only that the specimen was taken from the vocal cord.

TABLE I—CLINICAL DIAGNOSIS.

1. Undiagnosed (Tissue from Vocal Cord)	97
2. Polyp	57
3. Papilloma	26
4. R. O. Carcinoma	25
5. Granuloma	24
6. Juvenile Papilloma	12
7. Vocal Cord Nodule	11
8. Leukoplakia	10
9. Cyst	8
10. Laryngitis (Inflammation)	7
11. Singers' Nodule	5
12. Hyperkeratosis	4
13. Hemangioma	4
14. Benign Lesion	4
15. Keratosis	2
16. Mucosa	2
17. Ulcer (Inflammation)	1
18. Fibroma	1

This inadequacy is demonstrated in the details of the first Table, entitled, "Clinical Diagnosis." The form accompanying the section was usually completed by an assistant junior resident, the accurate record of the senior staff physician not being available. This was mainly true in regard to the earlier patients in the group, the defection having been corrected later.

Referring again to Table I, "Clinical Diagnosis," one will notice a large number in the undiagnosed category. The tissue was sent to the pathologist with very meager details concerning the history, plus the notation only that it was from a vocal cord. Further examination of this chart shows other

evidences of lack of detail and care in stating the preoperative clinical diagnosis.

Next, reference is directed to Table II, entitled, "Initial Pathological Diagnosis." One is impressed immediately by the numerous diagnoses made, and also by the similarity and minor variations in many of them. These differences may be

TABLE II—INITIAL PATHOLOGICAL DIAGNOSIS.

1. Polyp	81
2. Papilloma	42
3. Singers' Nodule	36
4. Granuloma	23
5. Laryngitis (Inflammation)	17
6. Squamous Hyperplasia	13
7. Juvenile Papilloma	11
8. Granulation Tissue	10
9. Inflammation with Hyperplasia	10
10. Cyst	9
11. Hemangioma	8
12. Hyperkeratosis with Inflammation	5
13. Hyperkeratosis	4
14. Inflammation with Metaplasia	4
15. Dyskeratosis with Metaplasia	3
16. Hyperplasia with Metaplasia	3
17. Leukoplakia	2
18. Dyskeratosis	2
19. Hyperkeratosis with Hyperplasia	2
20. Fibrosis with Myxomatous Degeneration	2
21. Pachydermia	2
22. Myofibroma	2
23. Edema	2
24. No Pathological Change	2
25. Inflammation with Myxomatous Degeneration	1
26. Hyalinization with Myxomatous Degeneration	1
27. Hyperkeratosis with Myxomatous Degeneration	1
28. Hyperkeratosis with Cyst	1
29. Hemorrhage in Muscle Fibers	1

attributed in part to the lack of close contact between the laryngologist and the pathologist, in addition to the fact that the pathologist's interest was more general than specific as far as abnormal laryngeal tissues were concerned.

The same sections presented in Table II were re-examined by a pathologist (D.S.), who was specially interested in the subject of abnormal laryngeal tissue and its problem of nomenclature. An attempt was made to re-analyze the entire

TABLE III—REVISED PATHOLOGICAL DIAGNOSIS.

1. Laryngeal Nodules	134
Unqualified	128
Qualified:	
With Hemosiderosis	2
With Hyperkeratosis	2
With Granulomatous Features	1
With Inflammation	1
2. Inflammation	34
Unqualified	10
Qualified:	
With Granulation Tissue	13
With Hyperkeratosis	8
With Ulceration	2
With Ulceration and Granulation Tissue	1
(No cases of Specific Inflammation such as Tuberculosis, Blastomycosis, Syphilis, etc., included).	
3. Squamous Papillomas	28
Unqualified	26
Qualified:	
With Dyskeratosis	2
(Includes Juvenile Papillomas).	
4. Laryngeal Polyps	27
Unqualified	18
Qualified:	
With Hyperkeratosis	1
With Dyskeratosis	1
Fibrous (Papillomas)	5
Fibrous with Hyperkeratosis	2
5. Epithelial Changes	25
Unqualified	
Qualified:	
Hyperkeratosis	19
Dyskeratosis	2
Carcinoma in Situ	2
Epidermoid Carcinoma	1
Hyperplasia	1
6. Cysts	12
Unqualified	4
Qualified:	
Columnar	4
Mucous	3
Squamous	1
7. Pyogenic Granuloma	10
Unqualified	10
8. Miscellaneous	30
Missing Specimens	15
Inadequate Specimens	9
Normal Mucosa	3
Hemangioma	1
Skin (error)	1
Nodular Lymphoid Infiltration (Lymphosarcoma)	1

group of 300 sections. Fifteen specimens could not be located and were classified as missing in the miscellaneous category.

The interpretations of this pathologist, working intimately with the laryngologists, offered an interesting study of the two groups, as recorded in Tables II and III. These studies have resulted in a simpler rearrangement or classification of abnormal benign laryngeal lesions, which, we are hopeful, will be of value to our local laryngologists and pathologists in the future; perhaps also, benefit, as far as prognosis and treatment are concerned, may be forthcoming as a result of this arrangement.

One may have noticed that in the collection of cases in this survey, no malignant neoplasms nor specific inflammatory

TABLE IV—COMPARISON: COMMONER LESIONS.

Diagnosis	Original Path. Diag. Number	Revised Path. Diag. Number
1. Polyps	81	27
2. Papillomata (Adult and Juvenile)	53	28
3. Singers' Nodules (Laryngeal)	36	134
4. Granulomata	23	10
5. Inflammations (Laryngitis)	14	34

processes of the mucous membranes are included. Many carcinomas and a few cases of specific inflammatory lesions of the cords, such as tuberculosis and blastomycosis, were encountered during the years of the survey, but were eliminated, as our primary interest was in benign lesions with little specificity. It was noted that apparently carcinoma of vocal cords was comparatively easy to diagnose, as when this diagnosis was made clinically, prior to histological examination, it was usually correct. In turn, when doubt was exhibited by the request, "Rule out carcinoma," sent to the pathologist with the tissue, carcinoma was generally not present.

As will be seen later, the pathologists had little difficulty in deciding upon the diagnosis of carcinoma, for in the approximately 300 examinations, only one fairly definite error in diagnosis was disclosed. One specimen was called benign,

but on second examination was thought to be unquestionably an epidermoid carcinoma.

Some comments will now be made with regard to the various categories used in the classification. Space does not permit a detailed study of all; only the commoner groups will be considered.

Benign Lesions: True Vocal Cords

Sex Incidence

300 Patients

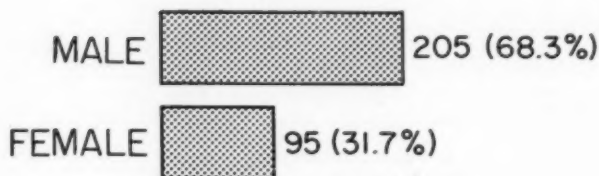
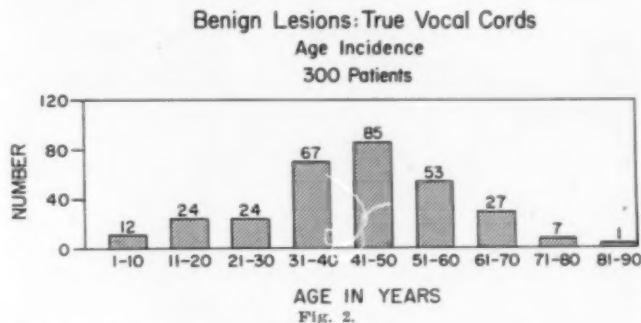


Fig. 1.

LARYNGEAL NODULES (VOCAL NODULE, SINGERS' NODE, CHORDITIS NODOSA, SCREAMERS' NODE, FIBROUS NODULE, CHORDITIS TUBEROSA, TEACHERS' NODE, ETC.

In the initial pathologic diagnosis (Table II), 36 patients were considered to have singers' or laryngeal nodules. When the same group of cases were re-examined by the second pathologist and laryngologist, the number in this category was increased to 134 patients, as will be noted in Table III. This is not particularly surprising, as there is much confusion in the nomenclature and histological interpretation of tissue from the vocal cords which may be classified as laryngeal nodules or laryngeal polyps. For instance, Stewart⁴ does not mention laryngeal nodules in his 104 cases of benign tumors of the larynx, but does have 61 cases of "Inflammatory Polypus." Epstein⁵ and his associates diagnosed 283 cases of laryngeal polyps in a group of 366 benign tumors, believing polyps, nodules, and polypoidal degenerations to be histolog-

ically identical non-neoplastic swellings of the membranous vocal cords. Salinger,¹ on the other hand, found that his pathologists diagnosed no polyps and only three vocal nodules in a series of 232 consecutive laryngeal biopsies. Undoubtedly, in our survey, Epstein and Stewart would have classified the majority of our nodular cases as polyps. There are many variants of nodules and polyps which may be placed in either class, depending upon the impression of the pathologist, and which are essentially different manifestations of one and the same condition. From our study, we must consider the laryn-



geal nodule as the commonest chronic benign lesion of the vocal cords for which tissue is removed for diagnostic and therapeutic measures.

A laryngeal nodule is a "specialized reaction to trauma" (Ash⁴), which is basically a localized nodular or polypoid area of degeneration of the lamina propria. These reactions of degeneration include fibrosis, edema, a myxoid appearance, fibrinous deposits, and even hemorrhage, necrosis and calcification. The overlying epithelium may be atrophic or slightly hypertrophic and hyperkeratotic. Kelly and Craik,⁷ Ash and Schwartz,⁸ have described these variations in some detail. We have followed their descriptions to a large extent in an effort to attain histological accuracy and simplicity. The edematous, fibrous, angiomatous and myxomatous characteristics are shown in the photomicrographs.



Fig. 3. Squamous papilloma of the larynx with redundant papillae of acanthotic squamous epithelium over a delicate and rather scanty stalk of fibrous tissue (H. and E. 110X).

LARYNGEAL POLYPS.

As in many of the categories proposed in our survey, again there were differences in the interpretation of the tissue presented to the pathologist, as far as the entity, laryngeal polyp, was concerned. In the first group examined (Table II), 57 cases were diagnosed as laryngeal polyps. This number was reduced (see Table III) to 27 cases when the tissues were re-examined. Some were transferred to the laryngeal nodule category. In some classifications, the laryngeal polyp is considered a stage in the development of the laryngeal nodule, and vice versa.

We have used this term for lesions that are polypoid, or projecting masses, composed principally of a central core of fibrous connective tissue of greater density than normal lamina propria and covered by a normal or only slightly hyperplastic or hyperkeratotic epithelium. The origin is from the subepithelial or Reinke's spaces. It seems to contrast with the papilloma, in that the stroma is predominant in the polyp, while the epithelium is predominant in the papilloma. Although the first stage (Ash) of the laryngeal nodule consists of subepithelial fibrosis, the early laryngeal nodule is not polypoid and, therefore, differs from this lesion we are calling a polyp. Polyps are pedunculated and may exhibit angiomatous and myxomatous characteristics. Polypoid degenerative changes are diffuse and sessile, and are sometimes described as laryngeal nodules.

INFLAMMATIONS.

The nonspecific chronic inflammatory group, numbering 34 cases, offered much less confusion and difficulties in the pathologic diagnosis than those classes previously considered. The histologic signs of inflammation are quite evident, and the number of cases of laryngitis with the various qualifications are similar to Tables II and III.

SQUAMOUS PAPILLOMATA.

The larger number of papillomata were so designated by the pathologist who performed the initial examinations. After



Fig. 4. Pyogenic granuloma of the larynx composed of a cellular granulation tissue with hemosiderin under a slightly hyperplastic and hyperkeratotic epithelium (H. and E. (110X).



Fig. 5. Polp of the larynx with pedunculated configuration, dense fibrous stroma and only slightly thickened or hyperkeratotic overlying squamous epithelium. This lesion is not as characteristically papillary in outline as is the papilloma (H. and E. 60X).

further consideration, according to the scheme previously outlined, the number in this section was reduced, with differences favoring mainly the nodular group.

The histological diagnosis was made on the basis of a papillary lesion, either pedunculated or sessile, composed of thick folds of hyperplastic, acanthotic, squamous epithelium, arranged over delicate, thin cores or processes of vascularized connective tissue, essentially similar to normal lamina propria. In view of our present knowledge, cases of this lesion can be divided, clinically but not histologically, into

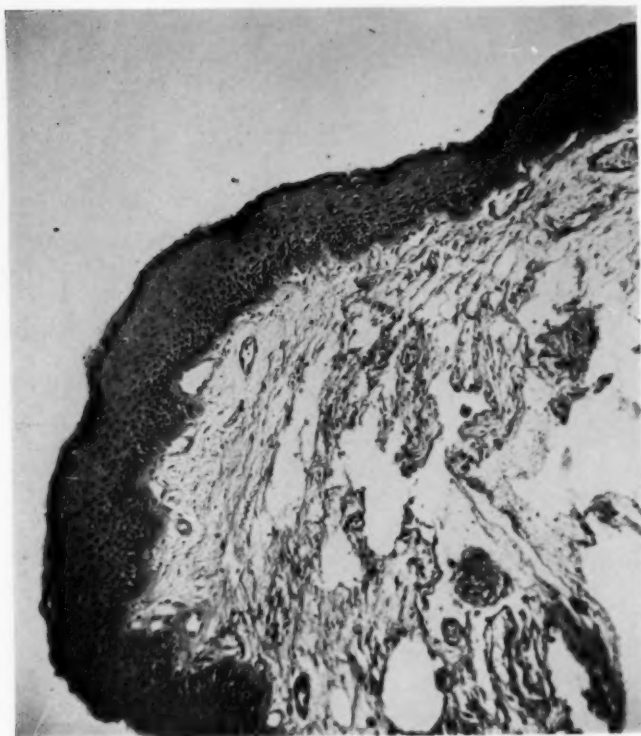


Fig. 6. Laryngeal nodule with angiectasis, myxoid stroma, coarse fibrinoid strands in the stroma particularly about the dilated blood vessels or lymphatics, and hyperkeratotic epithelium (H. and E. 110X).

juvenile and adult forms. These are tumors of epithelial origin.

EPITHELIAL CHANGES.

This is a division which, in any table of classification, could receive a wide variety of cases. In the first group examined, approximately 40 specimens were reported as showing some type of abnormal epithelial changes. Upon



Fig. 7. Laryngeal nodule, probably in an early phase, showing edematous stroma, small angiectasis and small amounts of fibrinoid strands in the stroma. The epithelium is slightly hyperkeratotic (H. and E. 110X).

re-evaluation, the number, as will be noted, was reduced to 25.

Hyperplasia, hyperkeratosis (hyperkeratinization) and dyskeratosis are not uncommon laryngeal conditions. Many of the less severe cases undoubtedly never come to biopsy. We do not believe that one sees the advanced dyskeratosis or leukoplakia of the vocal cord that one finds in the intraoral cavity. Epithelial changes of the mucosa of the vocal cords deserve the most careful scrutiny, and material should be removed for histological examination without procrastination. Such measures will eventually disclose an early carcinoma.

The two lesions secondarily designated as carcinoma *in situ* were either erroneously diagnosed or the carcinoma was removed as an excisional biopsy, for prolonged follow-up examinations have revealed no subsequent malignant developments. In the case of tissue diagnosed as frankly epidermoid carcinoma, we have not been so fortunate in our follow-up. Although all efforts were exhausted in attempting to obtain further information about this patient, these were without success.

CYSTS.

The diagnosis of cyst was apparently not difficult, pathologically. There was general unanimity of opinion in the examinations of the specimens.

PYOGENIC GRANULOMATA.

The granulomata, approximately 23 in number initially, after the revisional examination, became a group composed of only ten cases, the inflammatory category gaining therefrom.

The appearance of these growths was that of a localized, nodular, and commonly polypoid mass of granulation tissue, containing many capillaries, in a stroma of young fibroblasts. It is usually heavily infiltrated by histiocytes, and may contain an appreciable number of granular leukocytes. The overlying epithelium is customarily intact and hyperplastic, sometimes to the point of pseudoepitheliomatous hyperplasia.

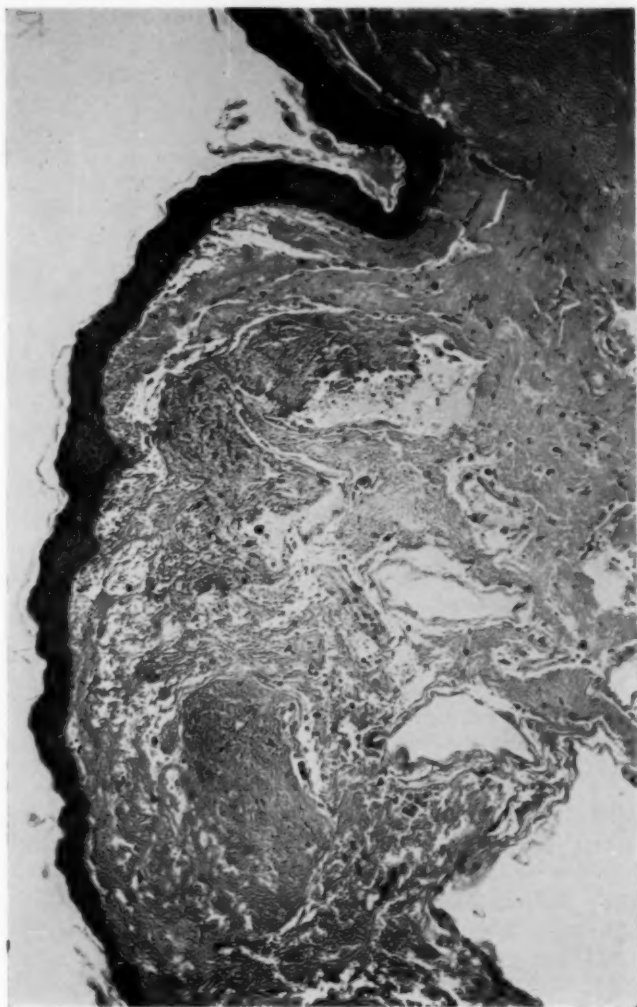


Fig. 8. Laryngeal nodule, probably in a late phase, with extensive fibrinoid and fibrous transformation of the stroma and hyperkeratosis of the epithelium (H. and E. 110X).

It differs from ordinary granulation tissue, which is frequently in an area of ulceration, showing superficial necrosis and intense, acute inflammation.

MISCELLANEOUS GROUP.

Of the original 300 sections, 15 were found to have been misplaced or misfiled, and could not be located for this study. The second pathologist considered the tissue of nine specimens inadequate for diagnosis, and these were rejected for further consideration. The corrected number of cases re-examined was 276, and it is gratifying that "normal mucosa" was reported in only three instances. One true hemangioma was present. The section of skin was obviously labeled improperly. The case of lymphoid nodular infiltration has been followed for several years, and there has been no subsequent evidence of lymphoma or leukemia.

COMMENTS AND SUMMARY.

A consecutive series of 300 specimens of tissue removed from the vocal cords of the same number of patients were examined histologically by two or more pathologists. The sections were collected over an eight-year period, ending May, 1957. Only benign lesions were analyzed, and no consideration was given to the oft-raised question as to whether benign overgrowths of subepithelial structures should be designated as "true tumors" or not. No cases initially diagnosed as carcinoma were studied in this survey.

The first analysis was carried out by pathologists who were genuinely interested, but not specifically, in laryngeal specimens. The second examiner was one who showed particular interest in this type of tissue. For various reasons, the second pathologist had the opportunity of reporting on only 285 sections rather than the 300 available to the initial group of examiners.

The sex incidence indicated 68.3 per cent of the patients as males and 31.7 per cent females, with the highest age incidence being in the 41 to 50-year group.

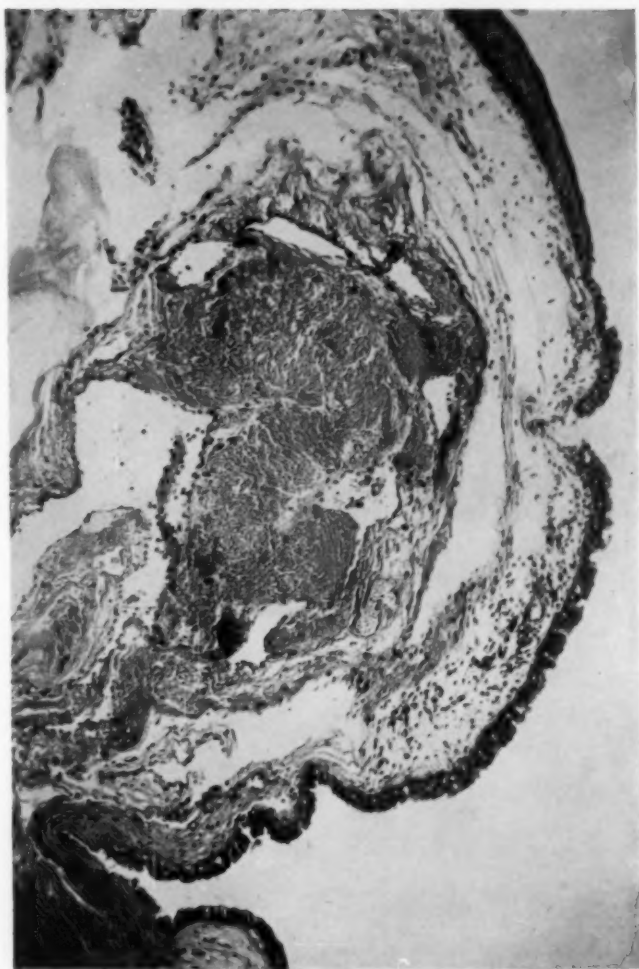


Fig. 9. Laryngeal nodule with large fibrinoid mass resembling an organizing thrombus (H. and E. 110X).

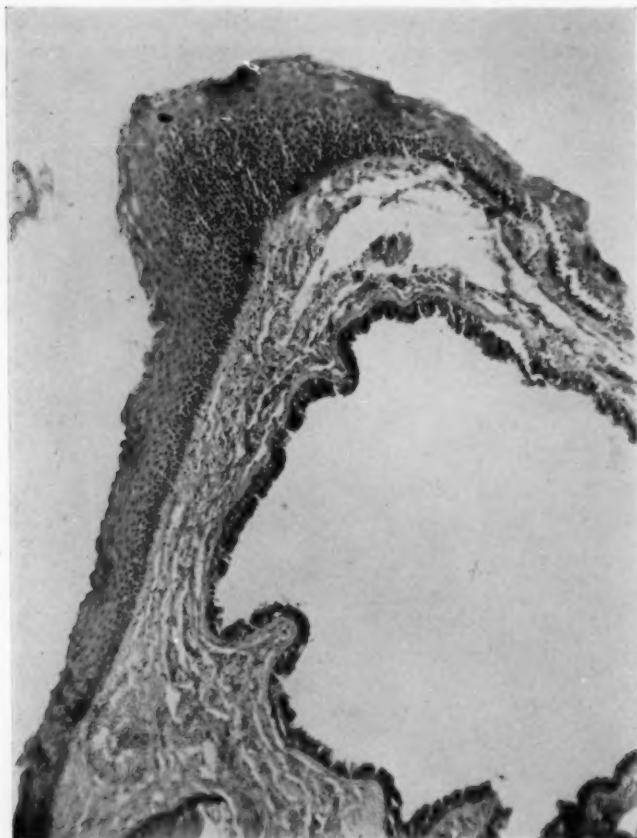


Fig. 10. Laryngeal cyst lined by columnar epithelium. The overlying squamous epithelium is slightly hyperkeratotic (H. and E. 110X).

From our own material and that available in the literature, there is obviously much confusion in the nomenclature and histological interpretation of benign specimens from the vocal cords. This is especially true of lesions arising from the subepithelial connective tissue layers (Reinke's space), which have been designated as nodules or polyps, depending



Fig. 11. Laryngeal cyst lined by cuboidal or simple squamous epithelium (H. and E. 110X).

upon the opinion of different pathologists. Some have considered a laryngeal polyp as a stage in the development of a nodule, and vice versa, not two clinical entities. The reason for this is apparent, as there are many variations in the histological appearances of these lesions, particularly in laryngeal nodules when degenerative changes have occurred. That

we can always histologically differentiate exactly between the two is certainly not clear. It would seem possible that the laryngologists and pathologists interested in this subject could establish a certain criterion for distinguishing between the two, which could be used to dispel the confusion that exists in the identification of these benign vocal membranous changes.

No definitive classification is attempted, because clinically it is difficult to do this, as there is so little difference in the appearance and conduct of many of the lesions. Again, from our survey, we must conclude that this same difficulty is experienced by the pathologist. In lieu of a classification, we have placed the results of our examinations in certain groups which will be helpful to us in clarifying the subject in the future.

Certainly, one admonition is recommended, namely, "laryngologist, know your pathologist." It is obviously desirable that the laryngologist, in turn, supply the pathologist with more detailed information about the gross appearance and characteristics of the tissue to be examined.

The accompanying photomicrographs illustrate some of the examples of the specimens described, and Table IV shows a comparison between the commoner lesions seen by the first pathologist with the revision in the diagnosis by the second.

Finally, in summarizing, it appears that the vocal cord lesions which seem to be the most confusing to all are the laryngeal nodule, polyp, and possibly the papilloma. Fundamentally, we consider the nodule as being an overgrowth of tissue containing an abnormal tunica propia, due to various degenerative changes, with an essentially normal surface epithelium. The polyp is an overgrowth of tissue with an increase in quantity of a normal, or near normal, appearing tunica propia with no degenerative changes and an essentially normal epithelium. These two lesions are of subepithelial origin. The papilloma is a tumor containing a normal tunica propia, but an abnormally broad hyperplastic epithelial surface which may show other minor metaplastic changes.

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AMERICAN ACADEMY OF OPHTHALMOLOGY AND
OTOLARYNGOLOGY HOME STUDY COURSES.

The 1958-1959 Home Study Courses in the basic sciences related to ophthalmology and otolaryngology, offered as a part of the educational program of the American Academy of Ophthalmology and Otolaryngology, will begin on September 1 and continue for a period of ten months. Detailed information and application forms may be secured from Dr. William L. Benedict, the executive secretary-treasurer of the Academy, 15 Second Street, S. W., Rochester, Minnesota. Registrations should be completed before August 15.

CANCER OF THE LARYNX.

Report of an Advanced Case Surviving 22 Years.

ARTHUR E. HAMMOND, M.D.,

Detroit, Mich.

In a previous article* the author reported on a series of 15 cases of carcinoma of the larynx which were analyzed from the point of view of age and sex incidence, etiology, classification, symptom complex, histologic grading and especially the various forms of surgical procedures. It was stated at that time that radiation therapy—besides being the method of choice in extrinsic carcinoma of the larynx—may prove of definite value in some advanced intrinsic carcinomas of the larynx having a high index of malignancy with glandular metastases.

The present brief communication is a report of Case II of that series, which in 1935 was referred for radiation therapy because of the advanced clinical stage of the lesion, and particularly since the histopathologic examination indicated a Grade IV index of malignancy. The patient has now survived, enjoying good health, for a period of 22 years.

REPORT OF A CASE.

The patient, an adult white male, forty-seven years old, was seen at the office on September 20, 1935, complaining of difficult breathing. The history was that of progressive hoarseness over a period of five months with recent painful swallowing, difficult breathing and a weight loss of 12 pounds.

Indirect laryngoscopic examination revealed a large fungating tumor mass, apparently arising from the right vocal cord, which was fixed. There was one large, soft, freely movable, lymph node in the right supraglottic area and two smaller soft and freely movable lymph nodes in the left supraglottic area.

The patient was admitted to Harper Hospital and direct laryngoscopy was performed on September 21, 1935, under local anesthesia. The epiglottis was edematous. A large bleeding fungating mass covered the right vocal cord with some involvement of the left vocal cord. The right vocal cord was fixed. Biopsy was taken from both vocal cords.

*Archives of Otolaryngology, January, 1942, Vol. 35, pp. 1-29.

Editor's Note: This manuscript received in The Laryngoscope Office and accepted for publication Jan. 8, 1958.

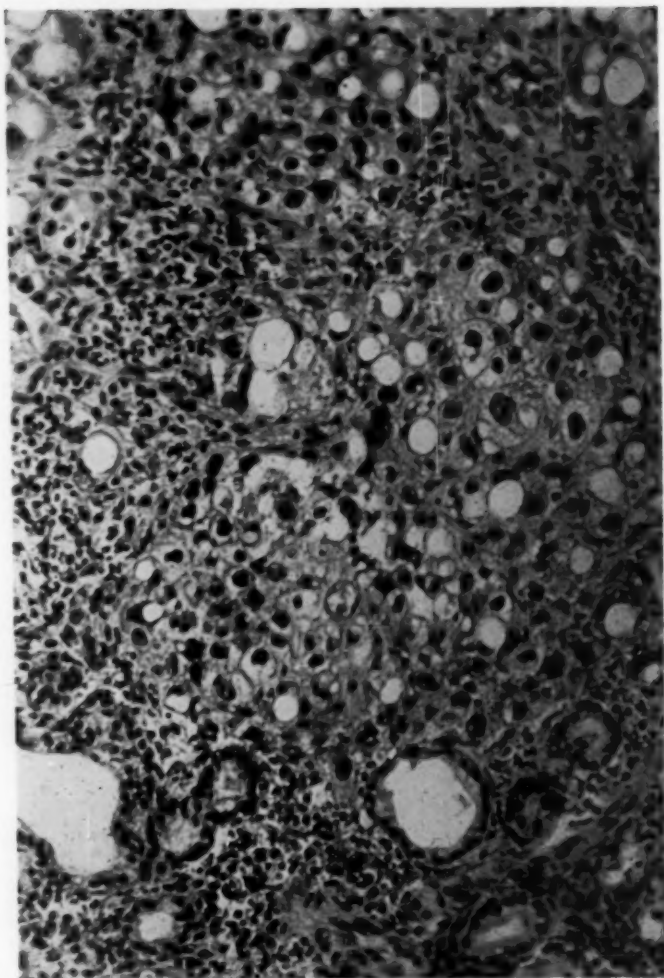


Fig. 1. Medullary squamous cell carcinoma of Grade IV malignancy with extensive anaplasia and nuclear degeneration. There were marked poikilocytosis and anisocytosis, with hydropic degeneration of protoplasm. The characteristic feature above all others was a very active lymphoid reaction. (Reproduced by permission of Arch. of Otolaryngology.)

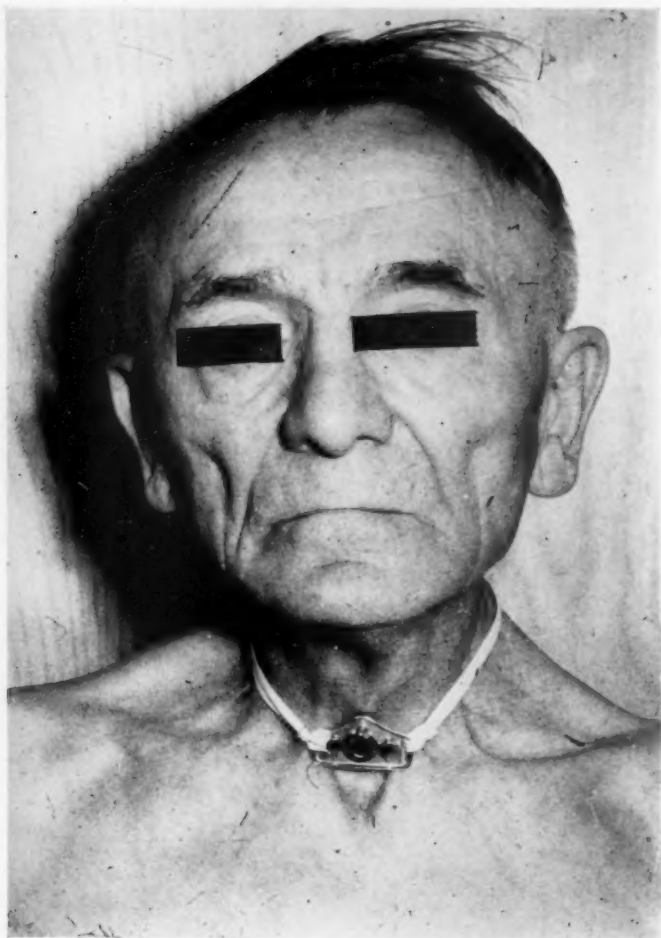


Fig. 2. Photograph showing appearance of neck 22 years later with the tracheotomy tube *in situ*.

The histopathologic report was that of medullary squamous cell carcinoma, Grade IV, with extensive anaplasia and nuclear degeneration. There were marked poikilocytosis and anisocytosis, with hydropic degeneration of protoplasm. The characteristic feature above all others was a very active lymphoid reaction (see Fig. 1).

On September 22, 1935, a low tracheotomy was performed under local anesthesia and, because of the extensive nature of the lesion, the patient was referred for radiation therapy.

Between September 24, 1935, and March 10, 1936, three series of super-voltage Roentgen therapy were given with 500 kv. (constant), 7 mm. Cu filter corresponding to a half-value layer of 9 mm. Cu. The fractionated

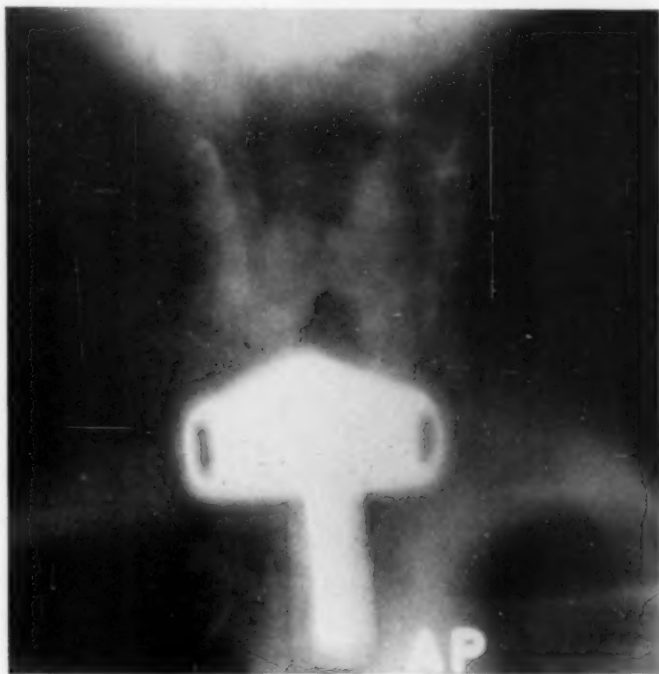


Fig. 3. Laminagram in the coronal plane shows the tracheotomy tube in place. There is a marked distortion of the glottic folds on the two sides, particularly on the left, but with the patient phonating the letter "e" a fairly good apposition of the vocal cords was obtained and the Morgagni space appeared fairly normal in contour.

protracted technique was used, the total cumulated dose on the pathologic areas being 7,000 r.

November 17, 1935. Tracheotomy tube was removed, and the opening closed spontaneously.

There was a satisfactory response to the radiation therapy, and subsequent periodic follow-up examinations gave the following findings:

September 5, 1940. The patient has gained five pounds in weight. He



Fig. 4. Lateral roentgenogram of the neck with soft tissue exposure and barium swallow shows no abnormality of the esophagus.

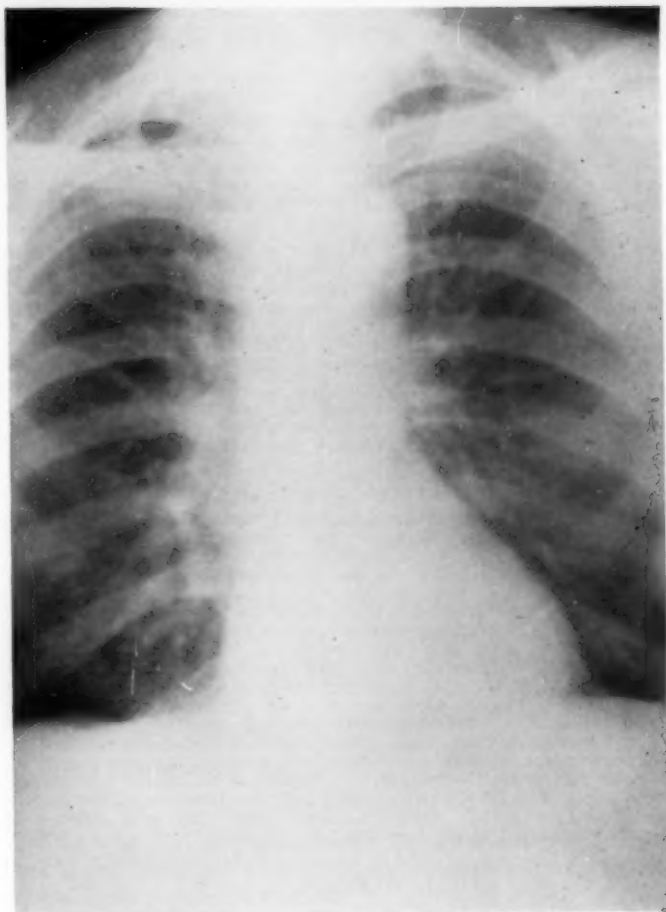


Fig. 5. Posteroanterior roentgenogram of the chest reveals slight generalized pulmonary edema with some prominence of the bronchovascular markings.

was in good general condition. There were no palpable lymph nodes of the neck and no hoarseness. Indirect laryngoscopic examination showed a normally functioning larynx. There was no evidence of any carcinoma, and the vocal cords were freely movable.

October 30, 1944. The patient has gained an additional three pounds,

weighing 144 pounds, and he continued to feel well. There was no evidence of cervical lymph adenopathy. Laryngoscopic examination was negative for any pathology.

July 11, 1945. Weight 144 pounds. Laryngoscopic examination negative. Neck normal.

February 21, 1948. Weight 148 pounds. General condition excellent. Larynx and neck normal.

October 26, 1956. Patient reported to the office with a history of recent spells of difficult breathing. There were no other complaints. Indirect laryngoscopic examination revealed abductor paralysis of both vocal cords.

On October 27, 1956, he was re-admitted to Harper Hospital for a tracheotomy. Examination at this time revealed a well developed and well preserved elderly white male who had obvious laryngeal stridor and hoarseness. His distress was not acute, and the stridor was more marked with expiration. The general physical examination was negative, and the laboratory data were all within normal limits. There was no evident induration of the structures of the neck and no enlargement of the cervical lymph nodes.

On October 28, 1956, direct laryngoscopy and tracheotomy were performed. The larynx was negative for any swelling, ulceration or tumor masses. There was bilateral abductor paralysis of the vocal cords of indeterminate cause.

The patient was discharged to his home on November 5, 1956.

On February 1, 1957, patient was re-examined. There was a normal appearance of the neck externally except that a tracheotomy tube was *in situ* (see Fig. 2). Laminagraphic examination of the neck was made in the coronal plane (see Fig. 3), which revealed the following findings: A tracheotomy tube was in place but did not interfere with visualization of the glottic area. There was a marked distortion of the glottic folds on the two sides, particularly on the left; but with the patient phonating the letter "e", a fairly good apposition of the vocal cords was obtained, and the Morgagni space appeared fairly normal in contour. Lateral roentgenograms of the neck with soft tissue exposure likewise showed the tracheotomy tube in place but no other findings. Barium swallow demonstrated no definite esophageal abnormality (see Fig. 4). Postero-anterior roentgenograms of the chest disclosed slight generalized pulmonary emphysema with consequent prominence of bronchovascular markings throughout the lung fields. There was an old pleural reaction in the left costophrenic sulcus region but no active lung disease. No parenchymal or pleural metastases were seen. The ribs, insofar as visualized, appeared intact (see Fig. 5).

SUMMARY.

A case of advanced medullary squamous cell carcinoma of both vocal cords, taken from a series of 15 cases published formerly, is reported briefly. The patient was treated with supervoltage Roentgen therapy and has now survived for a period of 22 years.

Harper Hospital.

A TECHNIQUE OF TYMPANOPLASTY (TYMPANOMALLEOLAR STAPEDIOPEXY).*

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Roanoke, Va.

In a recent article, "Technique of Tympanoplasty", published in the *Archives of Otolaryngology*, the author reported on two cases of tympanomalleolar stapedioplasty. It was noted that where possible, if the head of the malleus was preserved and rotated in such a manner that it were allowed to come in contact with the capitulum of the stapes, it not only served as a sound conducting structure, but also produced a tenting effect on the drum or new graft, thus preserving a greater vibratory capacity of the drum.

Since the vibratory capacity of the tympanic membrane, or new graft, plays the major role in the transformation of sound pressure from drum to oval window,¹⁻¹⁷ it is mandatory to maintain as much vibratory area as possible in the tympanoplasty procedure. Much work has been recorded in the European literature showing attempts to improve vibrating surface of new grafts. In a few cases Wullstein attempted to line the hypotympanum and tubotympanum with ocular conjunctiva or amniotic membrane. This would seem to make for a more complicated procedure in an already complex operation. House has described the use of vinyl prostheses placed in the hypotympanum and extending through the Eustachian tube.

In my own series of 100 cases of tympanoplasty, surveyed as of July, 1956, all Type III tympanoplasties or tympano stapedioplasties were carried out in the conventional manner, namely:

1. Tympano atticotomy and removal of diseased tissue from the antrum and removal of surgical bridge.

*Read at the meeting of the Southern Section, American Laryngological, Rhinological and Otolological Society, Inc., Memphis, Tenn., Jan. 25, 1958.

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2. Gross and microscopic examination of the ossicular chain for cholesteatoma or disruption of ossicular chain. If the otologist is assured of absence of intra-tympanic pathology, such as is many times the case in so-called primary cholesteatoma of pars flaccida, and if the stapes is mobile along with intact ossicular chain, the pedicle graft is used, the edges of the perforation are approximated and the patient is assured of reasonably good hearing at least above the 30 db. level. Some observers have stated that many times the hearing will recede in these cases due to

- a. eventual dislocation of the incus from the head of the stapes.
- b. adhesions from the pedicle hampering the movement of the ossicular chain.

I believe that dislocation of the incus is an operative hazard, and secondly, adhesions may be avoided if one preserves a high dome on the facial ridge, and if one preserves the anterior and posterior spines.

3. If there is bony ankylosis, or a dehiscence in the narrow portion of the long process of the incus constituting a break in the ossicular chain, one then elects to do a tympano stapedi-
opexy. The anterior and posterior spines are removed, and the facial ridge is lowered as far as possible, almost to the facial nerve itself. The tympanic membrane is mobilized posteriorly, escharred on its inner surface and tucked into the niche of the oval window contacting the head of the stapes. Many times the capitulum projects to the level of the lowered facial ridge, and contact is no problem.

Good results are obtained with tympano stapedi-
opexy in those ears with perforation of the pars flaccida and primary cholesteatoma, because as a rule the mucosal lining of the cavum tympanum is intact and the hypotympanum and tubotympanum are not involved. Likewise, good results are obtained where there are small marginal perforations of the pars tensa, providing one can preserve the mucosal lining of the tympanic cavity and the round window is demonstrated to be patent. In both of these cases the tympanic membrane

has its own natural simple stratified squamous inner lining, and good results are obtained in the majority of cases; again where there is only a marginal rim of drum membrane present and it must be preserved for attachment of the new graft to the denuded drum remnant. It not only serves as support for the new drum but also provides excellent blood supply for its preservation. Where the ear is dry and the mucosal lining of the tympanic cavity is thin and atrophic, good results will be obtained with tympano stapediopexy but in a smaller percentage of cases, because in an effort to contact the graft to the stapes adhesions and a lowered vibratory area results. If the mucosal lining of the cavum tympanum is hyperplastic and cystic it must be stripped away, along with carious deposits in the hypotympanum and tubotympanum, and the problem of maintaining a mucosal-lined cavity with a vibrating new drum contacting the stapes becomes increasingly difficult. If one errs in preserving the mucosa, he will many times end up with a persistently discharging ear, a slight or no hearing gain and a dissatisfied patient.

In the review of post operative results, it was noted that the larger the drum defect replaced with free graft contacting the stapes, even though all other ideal conditions in the tympanic cavity prevailed for optimum results, the less consistent were good hearing results. Many times, the three-week audiogram would show a good hearing gain, well above the 30 db. level, only to be followed by a gradual recession of the pure tone curve at or below the level of adequacy (30 db. level). This loss is unquestionably due to fibrosis of the raw inner surface of the new graft to the medial wall of the tympanum, resulting in reduction of vibratory capacity, thus lowering the sound conduction ratio. It becomes essential then to preserve as much vibratory area as possible, and to do this one should attempt to elevate the flap from the tympanic wall rather than merely to adhere it to the bony prominence of the cochlear promontory. Realizing that the promontory is necessary many times as a source of blood supply for the new graft, elevation of the graft is still not only a prerequisite but also a definite advantage as far as sound conduction ratio is concerned.

In the last 70 tympanoplasties, operated on since July, 1956, I, therefore, have concentrated on preserving the head of the malleus where possible, in all cases in which extensive intratympanic surgery was performed, and large free graft was employed, rotating it over the head of the moveable stapes and attaching the free graft to the denuded drum remnant, the head of the malleus and the facial ridge posteriorly. This creates a tenting support of the new drum and provides a greater vibrating surface at the oval window, as well as a shielding of the round window. Applying this principle to those cases in which it was necessary to employ radical removal of diseased hyperplastic mucosa in the entire tympanic cavity and obtaining a few good hearing improvements, I then employed the procedure in a few patients with pars flaccida lesions with uniformly good results. At the present time, where possible, the head of the malleus is preserved in all cases with large marginal defects and extensive disease of the tympanic cavity and where the stapes is deeply set, and hearing is in my opinion better than in stapes to drum procedures, due most likely to increased vibratory capacity.

It was noted that in one patient in whom a secondary fenestration procedure was performed on a dry radical mastoid cavity in which there was no gross evidence of mucosa-lined cavum tympanum, the patient received an excellent hearing gain to the practical level. This indicated that a mucosa-lined cavity extending from the round window to the Eustachian tube may not be necessary in all cases, but merely an air bubble over the round window would suffice for preservation of intra-labyrinthine phase relationship, providing the round window were patent and the stapes mobile. This would be especially true providing the mucosa were atrophic or absent.

CONCLUSIONS.

1. Tympano stapediopexy, or stapes to drum procedures, are employed where the membranous lining of the cavum tympanum is intact and the simple squamous lining of the tympanic membrane is normal, such as in a perforation of pars flaccida, cholesteatoma and ankylosed or broken ossicular

chain, assuming mobile stapes and normal round window membrane with patent niches are present.

2. Tympano malleolar stapediopexy, or stapes to malleus to drum procedures, are employed where large marginal drum defects (30 per cent or more) are present, and stripping of cystic hyperplastic mucosa from the tympanum, hypotympanum, and tubotympanum is necessary.

3. It is felt that preservation of the malleus rotated and applied to the head of the stapes produces a tenting effect and better vibratory capacity of a new drum more free of adhesions to the medial tympanic wall surrounding the stapes.

4. The observation is made of good hearing improvement to the satisfactory level in a secondary fenestration of a radical cavity in which there was no gross evidence of a mucosa-lined cavity from the tubotympanum to the patent round window, thus indicating that possibly in some cases only an air bubble over a functioning round window membrane is necessary for adequate intra-labyrinthine phase interval.

5. It is, therefore, theorized that in those patients with atrophic or absent mucosal lining in the vicinity of the round window area, if there is satisfactory tenting of a new graft, produced by the head of the malleus, assuming a functioning round window membrane exists, it is possible to achieve a satisfactory hearing gain, even though there is no gross evidence of mucosally lined cavity demonstrated by mobility of the new drum.

AMERICAN BOARD OF OTOLARYNGOLOGY.

The American Board of Otolaryngology will conduct only one examination in 1958, and this will be October 6-9, 1958, in Chicago, Illinois, at the Palmer House.

For further information address Dr. Dean M. Lierle, Secy-Treas., University Hospital, Iowa City, Iowa.

RESULTS IN TYMPANOPLASTY.

A Comparative Study of 76 Tympanoplasties, Contrasted with Modified Radical, and Radical Mastoidectomies.*†

BRUCE PROCTOR, M.D.,

Detroit, Mich.

Tympanoplasty may be defined as the combination of surgery for eradication of chronic ear inflammation and surgical reconstruction of the sound conducting and sound protecting mechanism. Frenckner¹ reported recently: "Tympanoplasty . . . is now embraced with greater interest in a number of different clinics in Europe. In my opinion, this would seem to have become one of the broadest and most important fields of operation within otology during the recent decades. In the United States, on the other hand, this operation is viewed with considerably more skepticism, and has not yet aroused the proper interest." My comment here would be, that many American otologists are now working in this field, and it is hoped that before long we will contribute to the progress of this concept, pioneered by European otologists.

From what we have learned in tympanoplasty, it is apparent that early operation of chronic ear inflammation is advisable, both from a functional and also from the microsurgical and anatomical point of view. When it is obvious that an inflammatory disease in the middle ear is irreversible by conservative measures, and will progress with functional deterioration, it is imperative that surgery be performed, even though an ideal result can not be promised. The earlier that this is done, the less destructive will be the pathological changes in the epitympanum, ossicular chain, drumhead, Eustachian tube, hypotympanum, annular ligament, and round window niche and membrane. Every attempt should be made to perform

*Read at the meeting of the Middle Section, American Laryngological, Rhinological and Otological Society, Chicago, Ill., Jan. 13, 1958.

†Department of Otolaryngology, Wayne State University.

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the reconstructive operation in one stage. Multiple operations tend to create more fibrosis and adhesion formation.

Five types of tympanoplasty (Wullstein²) have been advised to accommodate these various pathological changes:

Type I: Plastic closure of an eardrum perforation.

Type II: Preservation of the ossicular chain with large grafts covering the perforated drum and the bridge and/or ossicles.

Type III: Removal of the malleus, incus, and bridge, and the placing of a graft onto the drum remnants and head of the stapes.

Type IV: Removal of remnant of ossicles and bridge in cases without a stapes with a graft applied to the promontory or into the oval window and sealing off the hypotympanum, round window and Eustachian tube from the external ear.

Type V: Same as Type IV, with the addition of fenestration into the horizontal semicircular canal.

A comparison has been obtained between 76 tympanoplasties performed in the first ten months of 1957, with 75 conservative or modified radical mastoidectomies performed in previous years, as to results achieved. Against these two groups we have also tabulated a group of 50 radical mastoidectomies.

In demonstrating the results obtained in the tympanoplasties, one must consider, first of all, that these are the earliest cases attempted in this type of surgery; and second, these cases are so recent that final hearing results may be somewhat better than we demonstrate at present; furthermore, these cases are not selected, but rather represent consecutive cases that presented themselves and were operated upon, using various ones of the five types of tympanoplastic procedures described by Wullstein.²

The method of charting the comparisons is as follows: The hearing before surgery was averaged for the frequencies of 500, 1000, and 2000, and plotted on a vertical line. Gains in

hearing are indicated on the vertical lines by the shaded bars, and losses by open bars. No change is indicated by a short horizontal line. Bone conduction losses are indicated by the dotted lines dropped from the top of the charts. A bar connecting two vertical columns below the base indicates the two ears in one patient. If the conductive loss is greater than 30 db. for the main area of speech, the result is regarded as un-

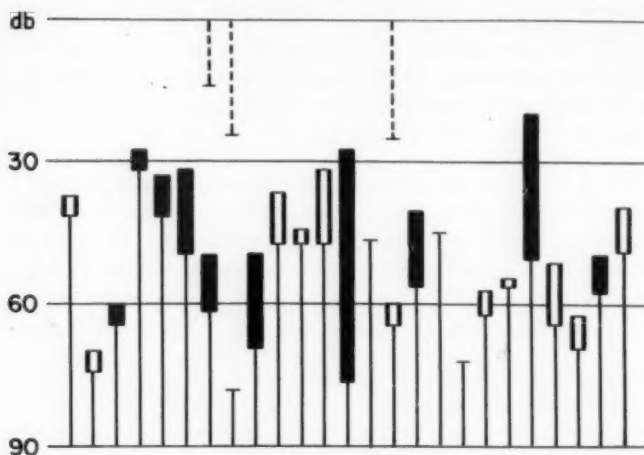


Fig. 1. Radical Mastoidectomy.

satisfactory, even though the operation produced a definite increase in the hearing.

Before considering the conservative radical mastoidectomy group, we shall review the results obtained in the radical mastoidectomies with respect to hearing gain or loss. This will give us some sort of base line to judge the effectiveness of the conservative radical ear surgery group. In the group of 50 radical mastoidectomies tabulated (see Figs. 1, 2), a total of 17 showed some gain in hearing, but only six improved over the 30 db. level. A total of 27 sustained further loss in hearing, and six were unchanged. Two cases with a marked gain in hearing, surpassing the 30 db. level, had healed spon-

taneously with a false drum adherent to the promontory and protecting the round window. Toward the end of this series were recorded a group with profound losses in hearing, due to serous labyrinthitis complicating fistulas in the horizontal canal. These cases submitted to radical mastoidectomy because of labyrinthine complications.

A group of 75 consecutive conservative or modified radical mastoidectomies were then reviewed; (see Figs. 3, 4, 5, 9).

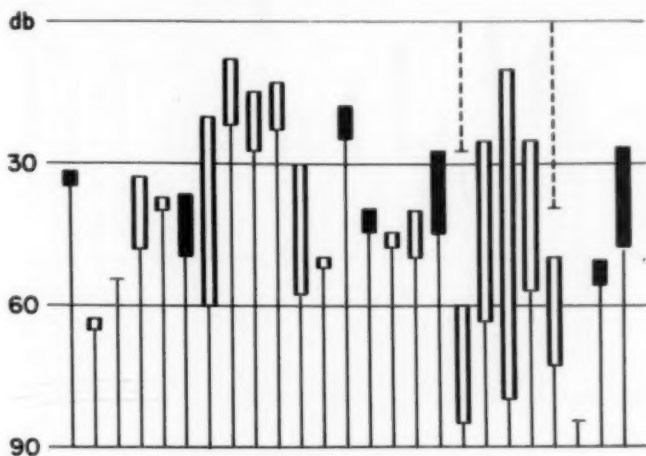


Fig. 2. Radical Mastoidectomy.

Many of these cases were undoubtedly candidates for radical exenteration, but because active pathology appeared to be confined to the attic and/or antrum, the middle ear was often not disturbed, hoping that some hearing would be restored. In almost every case the bridge was removed. In all cases the ossicles or remnants of ossicles were not removed. The drum was not elevated or disturbed in any way. When feasible a portion of the membranous posterior canal wall was left attached to the drum and swung on a pedicle to cover the ossicles. Failure to gain hearing if coupled with suppuration, was followed by radical revision. In 17 of the 75 cases, hear-

ing was brought up to or surpassed the 30 db. level. In 32 cases, preoperative hearing losses of less than 30 db. was maintained above that level. Thus a total of 49 cases (65 per cent) benefited audiologically by conservative radical mastoidectomy as contrasted with only 12 per cent in the radical group. Only five cases with preoperative hearing loss of less than 30 db. dropped below this level.

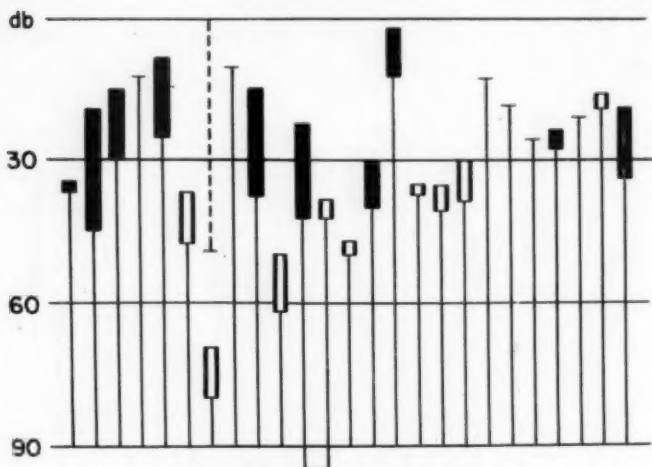


Fig. 3. Modified Radical Mastoidectomy.

In the first ten months of 1957 a total of 76 tympanoplasties were performed and their results compiled, even though many of them have not entirely healed. It must be remembered that a survey of this type does not give an accurate picture of the benefits of this surgery. For example, a cholesteatoma uniting disrupted ossicles may be responsible for relatively good hearing which drops considerably with the sole removal of the cholesteatoma. Zollner³ states that the starting point of rehabilitation should be reckoned at the lower level.

Plastic closure of an eardrum perforation—Type I tympanoplasty (see Fig. 6) was attempted in only four cases, with satisfactory results in three. The failure in the fourth case

is attributed to a perforation in the graft and to the formation of adhesions in the tympanum.

Preservation of the ossicular chain with large grafts covering the perforated drum and the bridge and/or ossicles—Type II tympanoplasty (see Figs. 6, 9) was performed in 23 cases. In five cases gains to above the 30 db. line were obtained. In seven cases further hearing gains above this line were recorded. In four cases some hearing loss occurred, but

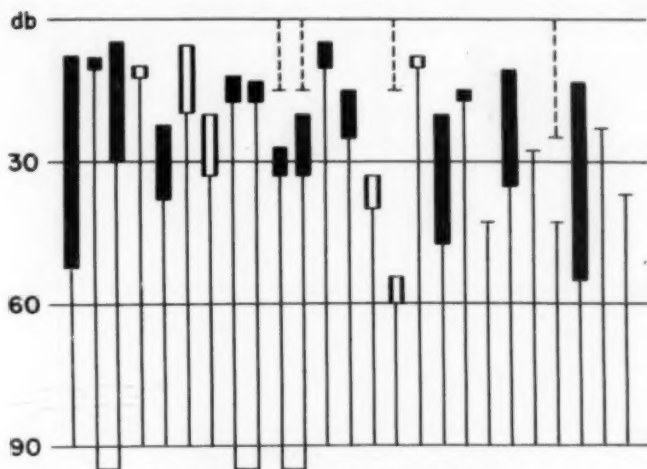


Fig. 4. Modified Radical Mastoidectomy.

remained at or above the 30 db. line. In seven the 30 db. line was not reached. Seventy per cent of these cases had hearing above 30 db., and of these 35 per cent had hearing above a 15 db. level. Wullstein² considers the 15 db. line a satisfactory level in Types II and III tympanoplasty. These results compare favorably with those reported in this same manner by Wullstein.⁴ The results are surprisingly similar to those obtained with the modified radical mastoidectomy in 75 cases (see Fig. 9). Jongkees³ reoperated nine Type II tympanoplasties and attributed failures originally to the following: Leaving ossicles with small defects, hoping that they would heal;

overlooking a disrupted ossicle; attempting to bring mutilated ossicles into contact with one another; insufficient removal of disease from middle ear or attic; covering active pathology with a skin graft, and granulation or cholesteatoma had reformed, and inadvertently overlooking a dislocation of the incus. At reoperation the middle ear was cleaned, the incus and head of the malleus removed and the drum placed on the head of the stapes.

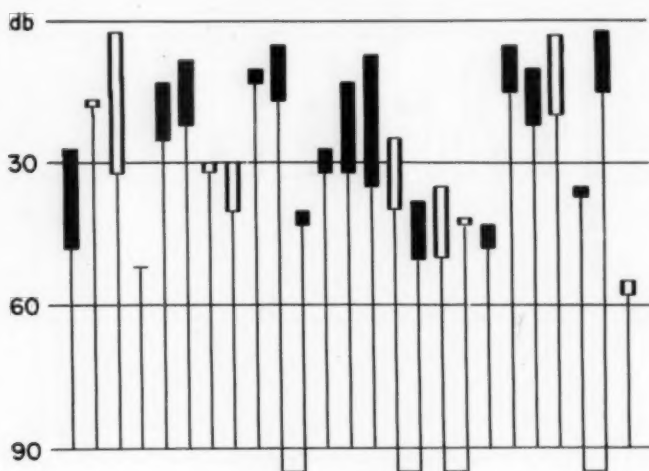


Fig. 5. Modified Radical Mastoidectomy.

Removal of the malleus and incus and the placing of a graft onto the drum remnants and head of the stapes—Type III tympanoplasty (see Figs. 7, 9) was performed in 26 cases. Hearing was improved in 20 cases, decreased in four cases, and remained unchanged in two cases. In 12 cases the 30 db. line was reached, and in five of these the 15 db. line was reached. In three cases hearing was maintained above the 30 db. level, and one remained above 15 db. The results reported by Wullstein⁴ are better, in that 17 per cent of his patients reached the 15-30 db. level. This gap could probably be narrowed in time by improvement in skill and judgment.

The relatively poor results in Type III, as contrasted to Type II, can be explained by the more extensive destruction of middle ear structures, and particularly the mucosal lining. Destruction of mucosa by the inflammatory disease process, combined with a more complete removal of the bridge, predisposes to more extensive postoperative adhesion formation, particularly about the stapes; also, often very little, if any, is left of the eardrum, and the manubrium of the malleus is

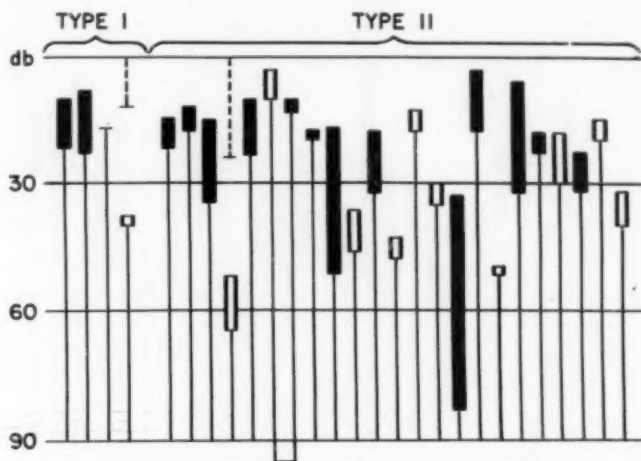


Fig. 6. Tympanoplasty, Types I and II.

removed, so that the newly created eardrum is audiologically less effective than the normal drumhead. Among nine failures reported by Jongkees² in Type III, the following factors were found responsible: The arch of the stapes had been broken, residual inflammation had continued to destroy the originally intact stapes, too stiff or calcified stapedius tendon which prevented vibration of the stapes, non-adherence of the drum or graft to the head of the stapes, and adhesion of the drum to the promontory, due to too thick a graft, or insufficient post-operative inflation of the Eustachian tube.

When the stapes is destroyed the latter cannot be used for its columellar (sound transmission) effect. One might

be able to use the transposition of a portion of the malleus or the incus to obtain a substitution columellar effect, (Miodonski,⁶ Hall and Rytznér⁷), but often that is not possible, so that the choice is to create sound protection for the round window with a graft applied to the promontory, and if necessary into the oval window niche with sealing off of the hypotympanum.

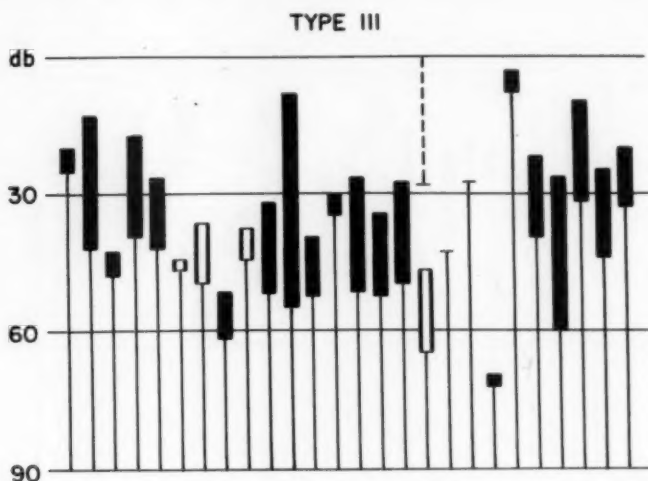


Fig. 7. Tympanoplasty, Type III.

If the stapes footplate is mobile or can be mobilized, it is left open to the radical cavity—Type IV tympanoplasty (see Figs. 8, 9). Kley⁸ states that post-operative hearing with the stapes footplate alone, or with only a membranous occlusion of the fenestra ovalis is not worse than with a preserved stapes or formation of an artificial columella. Seventeen cases were performed in this manner. Seven reached the 30 db. level of hearing, another four obtained a less satisfactory gain in hearing, one dropped below the 30 db. line, and four obtained no benefit.

Wulstein⁴ and also Richtner⁹ have reported a large number of theoretically excessively good results after Type IV tym-

panoplasty. This has been attributed to the relatively thick, relaxed graft which seals off the small tympanum, offering excessive sound protection to the round window while the stapes footplate remains free. Failures in 11 cases of Type IV tympanoplasty were revised by Jongkees⁵ and were attributed to: Closure of the oval window by tough connective tissue, the skin graft had not healed onto the oval window membrane or stapes footplate, a mass of tissue had formed

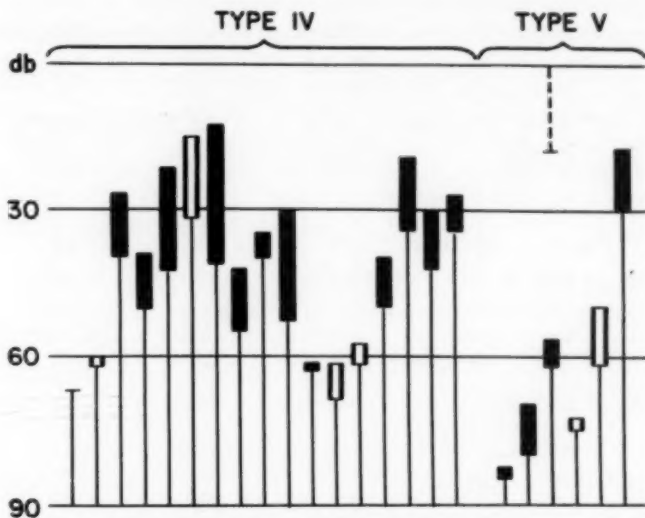


Fig. 8. Tympanoplasty, Types IV and V.

in between the flap and the membrane of the oval window, or that the flap was too firmly fixed to the promontory.

When the stapes footplate is fixed by new bone formation or dense adhesions so that it cannot be mobilized, one must consider then a fenestration into the horizontal semicircular canal with a graft again placed to seal off the round window, hypotympanum and Eustachian tube from the external ear—Type V tympanoplasty (see Fig. 8). Six cases were attempted in this fashion. The first five were old radical

mastoidectomy cavities with marked hearing loss in the opposite ear. The results obtained were all unsatisfactory because of one or more of the following factors: Mucosal grafts were placed across the hypotympanum to the Eustachian tube and may not have been effective, excessive fibrosis was present in both windows and probably reformed in the round window, three of the grafts perforated presumably because of poor vascularity, and in two the membranous labyrinth ap-

		ABOVE 15 db	15-30 db	BELOW 30 db
TYPE II	23 cases	35 %	35 %	30 %
WULLSTEIN		30	40	30
TYPE III	26 cases	19	39	42
WULLSTEIN		15	60	25
TYPE IV	17 cases	6	36	58
WULLSTEIN		19	50	31
MODIFIED RADICAL				
	75 cases	37	28	35

Fig. 9. Summary of results obtained in Types II, III, and IV tympanoplasty, and comparison of results reported by Wullstein in 350 cases; also results obtained in 75 modified radical mastoidectomies.

peared pathological, although preoperative bone conduction tests indicated good nerve function. Miodonski⁶ reports three cases of Type V tympanoplasty with a markedly reduced lumen in the semicircular canal and ampulla (phthisis labyrinthi, Zange). Preoperative vestibular reactions were weak in his cases. In the last case charted, one which had not been operated before, a satisfactory result was obtained.

The surgery of tympanoplasty offers much to the future

of otology. Type I tympanoplasty has its place in closure of benign and dry perforations of the drum. Type II is not much different from the old concepts of conservative radical mastoid surgery; but with the refinements of microsurgery, combined with experience and good judgment, we can eliminate some of the failures encountered with the conservative operation. Type III is a new concept of corrective surgery with restoration of function in a large percentage of cases which previously had been subjected to radical mastoidectomy. The surgery in Type IV is a distinct and marked improvement in the treatment of advanced middle ear disease and holds much promise for the future. The old alternative was the radical mastoidectomy, and it has been demonstrated that hearing results with that procedure are markedly poor. Type V in properly selected cases, and they are infrequent, should often result in gratifying improvements due to the achievement of sound protection for the round window and the creation of a new window open to the external ear.

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EARLY EXPERIENCE WITH TYMPANOPLASTY (WULLSTEIN TECHNIQUE).*†

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Until recently it has been customary to classify chronic otitis media and mastoiditis in two general categories: surgical and non-surgical. The basis of this division depended upon the likelihood of extension of the pathologic process to the brain, labyrinth or facial nerve, in the opinion of the classifier, and upon the presence or absence of cholesteatoma. This classification was a good, but not infallible guide, as cholesteatoma and intracranial complications can also occur in "non-surgical ears."

Numerous "modified" radical operations have been devised in an attempt to conserve or improve hearing in these patients. Such procedures have often resulted in satisfactory eradication of the disease, even though some had to be converted later to radical operations, but they have been rather disappointing from the standpoint of improvement of hearing. Thus the goal in the surgical treatment of chronic otitis media and mastoiditis is two-fold: primarily, eradication of the disease, and second, satisfactory postoperative hearing.

For many years otologists have been astounded by the occasional patient with healed chronic otitis media, or radical mastoid cavity, whose hearing was excellent. On inspection of these patients it was noted that a membrane had formed, enclosing the orifice of the Eustachian tube and the round window niche, and that occasionally this membrane was adherent to the stapes. Zöllner^{1,2} and Wullstein,^{3,4} working in different universities in Germany, made these observations and began working, in the years after World War II, to devise

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a surgical method for achieving this result, which they called "tympanoplasty." Since the recent publication of articles by these physicians in English and American journals, interest in tympanoplasty has been great in this country. Plastic procedures on the middle ear for closure of perforations and improvement of hearing have been developed during this same period, principally by American otologists, including Juers,⁵ House,⁶ and Wright, Guilford and Draper.⁷ These techniques are most interesting, but are not within the scope of this paper.

Although my experience with tympanoplasty is still limited, it was thought that some information might be gained from a brief review of my cases. Between March 21, 1957, and November 1, 1957, 16 tympanoplasties were done by me at Ochsner Foundation Hospital on patients ranging in age from four to 45 years. In the ensuing paragraphs selection of cases, technique, and results of tympanoplasty will be discussed in the light of this experience.

SELECTION OF PATIENTS.

Tympanoplasty can be performed on any patient with chronic otitis media and mastoiditis, provided cochlear function is adequate to warrant this more time-consuming and meticulous procedure. I prefer myringoplasty in patients with traumatic or long healed and dry central perforations that have proved resistant to more conservative attempts at closure.

Preoperative pure tone air and bone audiometry, and speech audiometry, are essential. Use of the acoustic probe, as advocated by Zöllner^{1,2} seems unnecessary to me, because the ossicular chain and window function will be inspected at operation. Its value is even questionable because of sound conduction by the diseased products present.

Preoperative determination of the predominate pathogenic organism and appropriate antibiotic, followed by a period of local and systemic treatment, is desirable but not essential. Disease of the paranasal sinuses and nasopharynx should be

treated preoperatively. Patency of the Eustachian tube must also be determined before operation.

TECHNIQUE.

The technique of tympanoplasty is not stereotyped; it must be adapted to the pathologic alterations present. Unless intracranial extension is present or imminent, the operation is done in one stage. The basic principles are simple, and have been lucidly presented by Wullstein.^{3,4} The principal factors in sound transmission to the inner ear are: sound pressure transformation from the tympanic membrane to the labyrinth, and sound protection of the round window. In Types I and II the ossicular chain is intact, and the attic is preserved; thus, both of these factors are present. In Type III sound protection of the round window and partial sound pressure transformation (through the "collumella effect" of the stapes) are present. In Types IV and V sound protection of the round window is the only factor present.

If an air-containing, mucosal-lined, middle-ear space, enclosing anteriorly a patent Eustachian tube and posteriorly a freely moveable round window membrane, can be developed and maintained, useful hearing will result, provided the stapes footplate is freely moveable and cochlear function is adequate. The following technique was employed in the cases in this series.

A full thickness skin graft is taken, half from the posterior surface of the auricle and half from the postauricular region, as advocated by Wullstein.^{3,4} The margins are undermined, and the defect is closed with mattress sutures. An endaural incision is made, and the posterosuperior membranous canal is removed by an incision to one millimeter lateral to the annulus. The mastoid antrum is exposed by removal of bone with cutting burrs posteriorly, beginning two millimeters lateral to the notch of Rivinus. A flat low bridge is formed, and all diseased mastoid cells are exenterated, care being taken to form as small a bowl as possible.

Attention is then directed to the middle ear and attic. The remainder of the operation is done through the operating

microscope. All vital areas must be inspected ("controlled") with as little disturbance to the remaining tympanic membrane and ossicles as possible. This includes the attic, ossicles, round window niche, mesotympanum, hypotympanum, and orifice of the Eustachian tube. This may be possible through a large central perforation. Often it is necessary to drill the control windows of Wullstein,^{3,4} to enlarge the attic by turning down Shrapnell's membrane and removing bone from below upward, or perhaps to cut the bridge anteriorly to remove the matrix of the cholesteatoma from the anterior extent of the attic. It is advisable to check the lenticular process of the incus and its articulation with the stapes early, as this is the most vulnerable portion of the ossicular chain, and if it is not intact, the procedure can be greatly shortened by removal of the bridge. All cholesteatoma and diseased mucosa must be removed from the attic, mesotympanum, hypotympanum, stapes or oval window, round window niche, and orifice of the Eustachian tube. This is accomplished by use of small scissors, curettes, cup forceps and suction. Mobility of the footplate of the stapes is determined by presence of the "change pressure" (stapedius reflex) sign. As much mucosa as possible is saved over the area that is to form the new middle ear. The areas that are to form the bed for the graft are prepared down to subepithelial tissue or to bone. After the annulus fibrosa, and as much of the tympanic membrane as possible have been saved, the entire area has been carefully inspected for residual disease, and bleeding has been controlled, it is time to place the graft. The graft should be carefully prepared beforehand and thinned of all subcutaneous tissue so that it is soft and pliable. Small pledgets of Gelfoam® soaked in penicillin solution are then placed over the area that is to form the new middle ear, extending from the orifice of the Eustachian tube into the round window niche. The graft is then laid in position, adjusted, and cut to fit. Larger pieces of Gelfoam® are placed over the graft, and the remaining cavity is packed with vasoline gauze strips, and a basket filled with small sponge squares.

Postoperatively, all packing is removed after six days, the Gelfoam® over the graft is removed on the tenth day, and the Eustachian tube is carefully inflated on the tenth to four-

teenth day. The tube is inflated at each postoperative visit thereafter, and the patient is instructed to inflate his ear carefully by the Valsalva maneuver daily.

TECHNICAL PROBLEMS.

In my limited experience with this procedure several minor technical problems have become evident. The graft should be wide. My early tendency to make the graft too narrow, and thereby produce less "pinning back" effect on the auricle, was an unwarranted fear, as in several months the auricle will assume its original position. A small new middle ear is desirable, as the smaller the free portion of the graft, the less likely it is for perforation to occur. A wide gap between the anterior wall of the external auditory canal and the facial ridge is desirable; the anterior edge of the graft should be bevelled, and should not extend too far laterally on the anterior wall of the external auditory canal. There should be no folds or overlapping of the graft, and the stapes footplate should be left uncovered by the graft in Type IV procedures. The bowl must extend to the level of the floor of the external auditory canal, and the facial ridge should be quite flat, to facilitate the placing of the graft and to permit easier postoperative care.

Experience in dissection and use of the drill through the operating microscope is rapidly gained, and presents no problem. Meticulous attention to detail in cleansing the stapes and round window niche is essential to a good result.

It has been said "better a good Type III or IV than a poor Type I or II." The less experienced the surgeon in this work the truer is this expression. The primary concern is complete removal of the disease, and plastic reconstruction of the sound-conducting apparatus will not be successful if this is not done.

RESULTS.

Of the 16 tympanoplasties, two were Type I, nine Type III, and five Type IV. Twelve of the 16 patients have intact, inflatable middle ears. Three have had perforations in the

graft, one of which was closed by cauterization and patching with regain of hearing. Two new middle ears have been closed by adhesions. Of the two patients who had Type I procedures, one has essentially normal hearing and the other a large perforation in the graft with no gain in hearing. One of the

TABLE I.
Audiologic Results of Tympanoplasty Types III and IV.

Type	Avg. db. Gain	Avg. P. O. Air Conduction Threshold Loss in db.	Max. db. Gain	Best P. O. Hearing Level in db. Loss
III	16	34	35	23
IV	14	38	32	27

patients on whom a Type IV tympanoplasty was done is scheduled to have a fenestration operation soon. The post-operative hearing status of the patients who had Types III and IV tympanoplasties is shown in Table I. Labyrinthitis and other serious complications have not occurred in this series.

CONCLUSIONS.

Tympanoplasty is a tedious and time consuming, but fascinating surgical procedure. The hearing gain in this series has fallen short of what is reported to be obtainable, but I have been encouraged by the early postoperative results, and believe that tympanoplasty is the treatment of choice for most patients with chronic otitis media and mastoiditis.

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SOUTH CAROLINA SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

The next joint annual meeting of the North Carolina Eye, Ear, Nose, and Throat Society and the South Carolina Society of Ophthalmology and Otolaryngology will be held in Asheville, N. C., on September 14-17, 1958, at Grove Park Inn. An excellent program is in the making. The following guest ophthalmologists will be present: Dr. James A. C. Wadsworth, New York, N. Y.; Dr. Arthur Gerard DeVoe, New York, N. Y.; and Dr. Frank B. Costenbader, Washington, D. C. The following guest otolaryngologists will be present: Dr. F. W. Davidson, Danville, Pa., and Dr. Tom Rambo, New York, N. Y. A third otolaryngologist will be announced in the near future. A good attendance is anticipated.

For further information write directly to Dr. George Noel, c/o Cabarrus Bank Bldg., Kannapolis, N. C., or Dr. Roderick Macdonald, 330 East Main St., Rock Hill, S. C.

PARAORBITAL LESIONS.*†

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This discussion will be limited to lesions which may cause signs and symptoms in the orbit and its contents, but which originate in areas adjacent to the orbit. Conditions to be considered in differential diagnosis will be enumerated and illustrated by cases in my experience. Anatomically, the para-orbital area consists of:

1. Nose and Sinuses.
2. Nasopharynx.
3. Cranial cavity.
4. Skin of lids and adnexa.

GENERAL DISORDERS.

Osteitis deformans (Paget's), osteitis fibrosa, and leontiasis ossea give characteristic X-ray findings. The lipodystrophies may involve membrane bones adjacent to the orbit. Diabetes insipidus and biopsy confirm the diagnosis. Fibrous dysplasia, sometimes called ossifying fibroma, begins in childhood with slow progression and is often apparently quiescent in the adult. It is characterized by absorption of normal bone and replacement by adult fibrous tissue in which new bone appears. Histologically there is sharp demarcation between normal bone and new growth and no periosteal or other host reaction. Radiographically the margins are vague.

INJURIES.

The tissue of the lids and bulbar conjunctiva are notoriously subject to extravasations of blood, giving the classical black

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eye. It is interesting to note that this hemorrhage does not necessarily come from direct trauma, but is often due to diapedesis through delicate capillaries. The capillaries on the lateral aspect of the bulb are most prone to this, as shown by the frequency with which extravasation occurs here as a result of excessive coughing and in rhinoplasty.

Epiphora and lid edema is common as a reaction to trauma or infection of the paraorbital area. Limitation of the globe and induration indicate orbital cellulitis, abscess, or cavernous

BENIGN NEOPLASMS OF NOSE, NASOPHARYNX, AND SINUSES.

Adenoma	} usually polypoid	Mixed tumor
Angioma		Myxoma
Chondroma		Neurilemmoma
Endothelioma		Neurofibroma
Fibroma		Odontoma
Fibrous dysplasia (ossifying fibroma)		Osteoma
Hamartoma		Papilloma (inverting)
Juvenile angiofibroma		Plasmacytoma
Lipoma		Teratoma

TABLE I.

sinus involvement. In response to a blow, the skull and facial bones become deformed, with or without fracture. This sudden deformation may cause a tear or injury to soft tissue even when fracture does not occur, as for example hematoma of the maxillary sinus associated with orbital edema.

Blows to the zygoma often cause fractures of the orbital margin inferiorly and laterally in conjunction with fracture of the zygomatic arch. In evaluating such a fracture it is imperative that alignment of the delicate plate-like floor of the orbit be determined radiographically. It is well to remember that fractures here may not be demonstrable by routine films. If fragments are depressed into the antrum enophthalmos

results when edema subsides. This used to be called fat atrophy following injury, but is due to herniation of orbital contents into the maxillary sinus by scar contraction. Replacement and maintenance of these fragments by packing, inflated balloon, etc., through a Caldwell-Luc incision is usually necessary.

Emphysema of the orbit may be associated with fractures involving the sinuses, particularly the ethmoid. Emphysema occurring without trauma may indicate an eroding lesion, *e.g.* ethmoid osteoma.

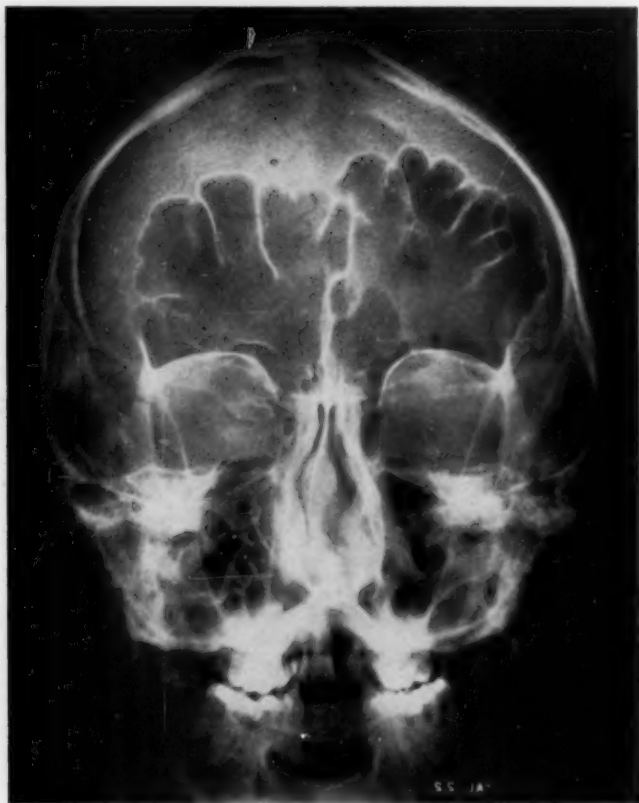
MALIGNANT NEOPLASMS OF NOSE, NASOPHARYNX, AND SINUSES.

<u>Carcinoma</u>	<u>Sarcoma</u>
Adenocarcinoma	Angiosarcoma
Anaplastoma	Chondrosarcoma
Chordoma	Fibrosarcoma
Epidermoid carcinoma	Lymphosarcoma
Neuroblastoma	Malignant schwannoma
Transitional cell carcinoma (lymphoepithelioma)	Melanoma
Undifferentiated carcinoma	Myeloma
	Osteogenic sarcoma
	Reticulum cell sarcoma (Ewing)
	Rhabdomyosarcoma

TABLE II.

NOSE AND SINUSES.

The relation of the nose and sinuses to the orbit is characterized by thin bony partitions with frequent dehiscences, absence of orbital lymphatics, and free anastomosis of veins. We may consider that blood from the sinuses drain into the cavernous sinus via the orbit, and in sinusitis, extension to the orbit is by phlebitis. The frontal sinus is insignificant below age seven, and maxillary sinusitis causes orbital complications only when there is osteomyelitis. The sinuses account for 60 per cent of orbital infections. Of these the frontal is most often the cause, except in younger children where ethmoid disease is more important.¹ Granuloma may be specific, *e.g.*



Chondrosarcoma of the nose causing unilateral proptosis and bilateral visual impairment.

Fig. 1. Indeterminate findings by usual views.

scleroma, yaws, syphilis, etc., or non specific. The midline (lethal) granuloma remains an enigma. Cysts such as dermoid and dentigerous may extend into the orbit.

SINUSITIS.

Acute fulminating frontal sinusitis may occur in younger individuals with normal sinuses, often after swimming. Acute



FIG. 2. Planigraphic demonstration of tumor.

Exacerbations of chronic disease, or recurring acute attacks indicate underlying pathology such as inadequate aeration. Obstruction is in the nasofrontal connection, and not in the nose. Such procedures as removal of nasal polyps, infraction or amputation of the middle turbinate, and submucous resection may be indicated, but rarely relieve the basic obstruction.



Fig. 2a. Basal view of skull showing encroachment on nasopharyngeal airway and obliteration of foramina and Eustachian tube.

Nasopharyngeal lymphosarcoma causing proptosis, paralysis of the Vth nerve and extension to middle and external ears on admission. Complete regression under X-ray therapy with subsequent metastasis to lungs.

Bone reacts to infection by either proliferative or destructive changes. The former is commonly seen as a condensing osteitis of the sinus wall, and usually indicates a chronic and milder process than demineralization. Sinus tracts may extend to the lids or orbit. Local destruction of marrow (osteomyelitis) indicates a more acute process. Because of intimate

venous connection between marrow spaces, dura, and periorbita, both intra cranial and orbital complications may occur in the osteolytic type. Reactive orbital edema is common with acute sinusitis.

Mucocele. Mucocele causes erosion and absorption of adjacent bone with encroachment on the nose, orbit, and dura. The frontal sinus is most commonly involved in adults, and

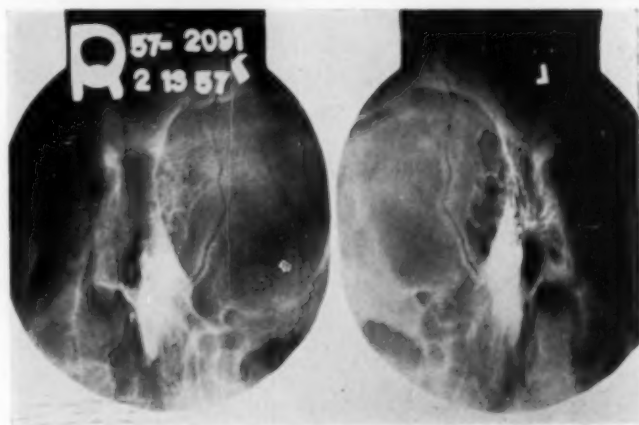


Fig. 2b. Mayers views showing coalescence of external canal, antrum, and adjacent cells.

the ethmoid in the young. The maxillary and sphenoid sinuses are rarely affected. The symptom calling for medical attention is usually painless deformity—in the case of the orbit proptosis. Diagnosis is usually made by X-ray, which shows thinning of walls and obliteration of normal scalloping of the frontal sinus or coalescence of ethmoid cells. Periodic ophthalmoplegic migraine and proptosis may indicate sphenoid mucocele. If a mucocele exposes both the periorbita and the dura there may be a pulsating exophthalmos.

Neoplasms. Tumors involving the orbit occur approximately as follows:⁶ primary 60 per cent; paraorbital 30 per cent; metastatic 10 per cent.



Fig. 2c. Pulmonary metastasis.

The eye is able to adapt to slow invasion of the orbit, as by a benign tumor without the development of diplopia, or limitation of excursions even when proptosis is marked. The development of diplopia and reduced mobility with little proptosis is, therefore, an indication of a rapid orbital invasion, and is more characteristic of a malignant tumor.¹

Nasal polyps of the mucoid type practically never encroach on the orbit, but the presence of nasal polyps may mask more deep seated disease. Repeated biopsies, sometimes through

external incisions, may be necessary to establish the presence of a neoplasm. The use of iodized oil, Papanicolaou smears, and aspiration biopsy have questionable value, in that a positive finding must be confirmed by open biopsy, and a negative finding is valueless.³ The presence of unilateral polyps and discharge, or epistaxis, particularly warrants thorough study.³

Osteoma is an encapsulated bony tumor originating from disturbed or displaced cartilage. Cortical, cancellous, and

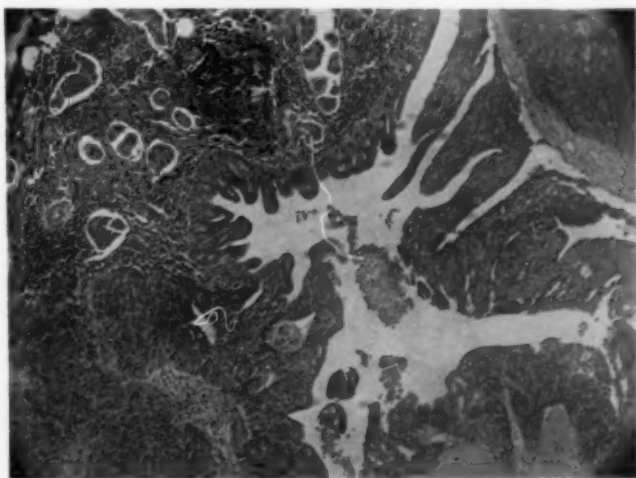


Fig. 3. Basal and squamous carcinoma of lids with extension into orbit requiring exenteration and metastasis to cervical lymph nodes.

mixed varieties are recognized. They are slow growing and produce symptoms by obstructing passages causing mucocele or secondary infection, sinus tract formation, or encroaching on adjacent orbital or cranial areas. The frontal sinus is involved in one-half of the cases, the maxillary in 10 per cent, and the ethmoid in the rest.^{1,4} Sphenoid involvement is very rare.

Carcinoma of the paranasal sinuses constitute only 0.2 per cent of all carcinoma.³ Of these by far the greatest number

originate in the antrum, and the balance in the ethmoid. The frontal and sphenoid are usually secondarily involved.¹ Males are affected twice as often as females for both osteoma and carcinoma. Unless the tumor originates superficially and causes early obstruction or bleeding, the diagnosis is usually made late. X-rays usually fail to reveal the full extent of the lesion.

NASOPHARYNX.

Malignant tumors of the nasopharynx constitute about 3 per cent of all malignancies, and are most often epidermoid in the adult and sarcomatous in the young. They may spread to the orbit, intracranially, or along the Eustachian tube. The peritubal syndrome (triad of Trotter) consists of deafness due to serous otitis media, neuralgia due to involvement of the mandibular division of the Vth nerve and palate palsy. The syndrome of the orbital apex (petrosphenoid syndrome) consists of palsy of one or more nerves II, III, IV, V, VI, and the sympathetic (Horner's syndrome). The orbit becomes involved by extension in the foramen lacerum along the carotid artery to the superior orbital fissure, or by extension from the pterygoid space to the inferior orbital fissure. Deep seated parotid tumors may affect the orbit by the latter route. Some primary malignant lesions may not be recognized, even in the presence of cervical metastasis, which occurs in 75 per cent of cases. In 50 per cent, the first symptom is ocular, *viz.* diplopia, pain, or reduced vision. Fifteen per cent have symptoms referable to the ear—pain, fullness, deafness, as the initial complaint.¹ Any case of otherwise unexplained cervical adenopathy, otalgia or deafness, facial pain or anesthesia, or diplopia, should have a thorough examination of the nasopharynx and biopsy of any suspicious lesions.

Juvenile angiofibroma occurs usually in male adolescents, grows to about age 25 and then recedes. It may originate from any part of the base of the skull, often with multiple attachments. It absorbs adjacent bone by slow growth, and may extend intracranially into the orbit, nose, sinuses, and sphenopalatine fossa. Recurrent severe epistaxis, nasal

obstruction, or secondary sinusitis is common. Biopsy of such a tumor had best be done in the operating room.

Chordoma is a tumor originating from the cranial end of the notochord. It may occur in the nasopharynx, sphenoid or intracranially. X-ray may show a bony defect at the site of the tumor. A partial list of other tumors to be considered is shown in Tables I and II.

SKIN AND ADNEXA.

Malignant tumors of the skin may extend into the orbit. Lid tumors are frequently baso-squamous. It is well to remember that while basal cell tumors practically never metastasize, the baso-squamous type do. When an epidermoid lesion involves only soft tissues, treatment by either radiation or surgery may be considered. When bone is involved the prognosis is grave, and treatment by any method is difficult; but surgery provides a better prognosis than radiation. Acute inflammatory processes of the skin or lachrymal sac may cause orbital cellulitis or abscess, while chronic lachrymal sac infections may produce sinus tracts.

CENTRAL NERVOUS SYSTEM LESIONS.

Central nervous system lesions, causing orbital symptoms may be considered under the heading of tumors, cavernous sinus thrombosis and A. V. aneurysm.

Probably the most common intracranial tumor associated with the orbit is meningioma arising in the vicinity of the sella or sphenoidal ridge. The latter may extend into the orbit as well as intracranially. Marrow bone adjacent to such a tumor often reacts by causing hyperostosis while cortical bone is absorbed. Characteristic X-ray findings and the syndrome of the orbital apex are diagnostic. Proptosis and optic atrophy usually precede neurological findings and pituitary dysfunction. Pituitary tumors extending into the sphenoid may be best treated by the otolaryngologist.

Cavernous sinus phlebitis is usually due to toxic swelling of the endothelium and thrombosis to stasis. The original source of infection may be as follows:

1. Skin of the face (especially the lids, lip, and scalp, via angular and superior ophthalmic veins).
2. Nose: (via ethmoid and ophthalmic veins).
3. Teeth: (via pterygoid plexus and inferior ophthalmic vein).
4. Ear and Mastoid: (from lateral sinus or via petrotympanic fissure to pterygoid plexus and inferior orbital vein).
5. Throat: (via pterygoid plexus and inferior ophthalmic vein).

Cavernous sinus thrombosis may also occur in blood dyscrasias and septicemia.

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THE WONDER DRUGS—A PSYCHOSOCIAL PHENOMENON.*

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New York, N. Y.

It is said that the history of civilization has as its mirror the history of medicine. The art and practice of medicine has been intimately interwoven into every phase of man's accomplishments; for always the history of a nation's economy, growth, intellectual and artistic attainments have been dependent upon the health of its people.

Revolutionary concepts in science and medicine have through the ages opened new horizons and new vistas for the study of man. Every generation seems to have brought with it newer accomplishments, newer therapeutic techniques, newer diagnostic facilities, all bringing with them a growing feeling of encouragement and hope.

All therapies from time immemorial have had as a valuable ally an aura of magic and sorcery. Even today disease is still enshrouded by a veil of mystery. Invisible pressures, apparently beyond the control of the individual, seem to exert forces that convert health to illness. Disease seems to be endowed with special malice governed by an invisible mystic force. Fevers, chills and anxieties uncontrollable and unyielding have been recorded as having these mysterious overlays. Disease is considered capricious and punitive, especially by those plagued with guilt for real or fancied sins.

Mores are different in all civilized and primitive societies. The character of the taboos may vary with special enlightenment, but the violated taboo always suggests that disease is punishment for sin and guilt. The invisible devil exerting his malicious charms is given special credit for the causes of disease. Civilized societies impose similar supernatural quali-

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ties to the mysteries of modern-day illness. We, too, seek the cause of disease in quasi truths and fiction, departing slightly from the primitives who seek theirs with magico-religious incantations. Magic, the unexplained, is as vital an element in the healing as in the cause of disease.

The potency of the sorcerer and the efficiency of his art, regardless of the nature and cause of sickness, lies in the magical healing qualities of his prescription. The greater the rarity, the greater the difficulty in obtaining it, the greater the expense, the greater is the potential curative power of that drug. Rarity is the exploitable element in the sorcerer's armamentarium of magic. Exorcism, one of the precursors of the psychosomatic concept, was a potent technique against any spiritual intrusion. The magico-religious implications of the etiology and cure of diseases has its specific roots in the social and economic structure of any particular society. Therapy in primitive society is rational in terms of its particular world of magic and the supernatural. For these primitives it is logical and predicated on the faith in the tribal healer. The rapport between the savage and the sorcerer, his medical consultant, is solidified by exquisite faith based on past accomplishments. Witchcraft and black magic, born of scientific limitations in primitive society, has its exact counterpart in the medical practices of today's society.

All therapy has evolved through distinct periods of ignorance and truth. The parallel relationship between disease and therapy can be used for study of one or both. At first all therapy was magical, mystical and religious, and had no basis in fact. Therapy was then nonempirical and based on illogical postulates. The next phase of enlightenment was the pre-scientific era when therapeutic procedures were based on abstract or metaphysical ideas, combined with the beginning of the empirical approach. Later came the positivistic or early scientific attitudes toward therapy based on the study and observation of natural phenomena. Unfortunately, during this period there was as yet not enough interdisciplinary knowledge for the adequate explanation of these anatomical and physiological phenomena.

The era into which we have grown with scientific maturity

is one whose accomplishments are based on scientific postulates, scientific observations and thorough analysis. Therapy attained its full maturity with the realization that no science can be isolated or insulated from all other biological, philosophical or social disciplines. The therapeutic ultimum could only be attained by extensive interdisciplinary exchanges of all allied information.

The advances and correlation of this interdisciplinary knowledge is rapidly bringing us to a peak of scientific accomplishment. Physical, chemical, biological and social studies, combined with psychoanalytical disciplines, are all represented in this mature humanistic era of medicine. Medicine incorporates these scientific studies, piloted by the physician who applies them for clinical therapy. The horizons have thus been expanded for today's doctors. They must not be burdened or limited by any sociological pressures and revert to ancient concept of therapy.

Language is the basic means of communication between the doctor and the patient; yet each speaks a different language, one that needs amplification and explanation. The confusion of this language barrier is elaborated because the patient seems to "hear with an accent." The patient listens but hears with a distortion born of the tensions and anxieties of illness. Illness destroys the emotional stability of many patients, or at least alters it. It is in this off-balance position that they first make contact with their doctors. Long after the disease and its devitalization has passed, the doctor continues to be identified with painful symptoms, complaints, alteration of productivity and financial burdens. Thus the physician evolves as a predatory subversive who parasitically thrives on the patient's misfortune.

The doctor is considered by the patient as the possessor of infinite wisdom, and is invested with the cloak of symbolic reverence and adulation. Subtle pressures are imposed upon him to maintain this precarious position of limitless knowledge. Rarely is he permitted the luxury of saying "I don't know" or "I will find out." Answers are a must, even if fiction is substituted for fact. Fiction thus created must

later be denied or confirmed with additional fiction. Errors thus become fixed in the mind of the patient who is convinced of the omniscience of his doctor. For, a simple thought, cloaked in a polysyllabic phrase, can become a confusing enigma reaching culmination in wonderment and awe by the patient.

There are many such paradoxes in the doctor-patient relationship that must be reconciled before complete solidification of this important unity is to be achieved. Patients resent being emotionally and physically undressed and exposed to the intricate and labyrinthine investigations that seem to be aimed at the annihilation of their personal ego. The doctor sometimes sadistically enjoys the authoritarian position that allows him to intrude into every crevice of the patient's life. Doctors have been enveloped with a halo of godliness for so long that they have grown to enjoy its magical potency.

Many doctors are offended when their right to their god-like pinnacle of prominence is questioned. They wear their protective cloak of godliness, fearing only that if defrocked they will reveal their human frailties and expose their medical inadequacies.

The desperate need and impulse to "do something" is the doctor's response to anxiety superimposed on him by the patient. The stress of fear and anxiety that invariably accompanies all disease makes urgent therapeutic action a necessity. This stress is a profound pressure on the relationship between the patient and the doctor. It is the same pressure of anxiety which expressed itself in sacrifices at the altar or in visits to the shrine of an oracle. It is the same impulse that led primitives to search out the strange herb for concoctions for the sick. Ignorance of the potential or the ingredient of the herb played no part in the motivations to give it. Out of this sociological pressure has grown the philosophy of the placebo. Medicine has never been divorced from this concept. Implicit in the function of all drugs, with or without a specific pharmacological action, is the important emotional value of the placebo. Even the antibiotics, used judiciously to destroy a specific organism have the distinct emotional overtones of the placebo.

It is not my purpose to become too involved in general semantics or in psychoanalytical interpretations. May I be forgiven if I recall that a fundamental to the relationship between the doctor and the patient is the need for dependence and perhaps a regressive infantile need for punishment. The authoritarian personality, the protector, the physician becomes the embodiment of support and security of the parent. Patients classified as placebo reactors with a distinct evidence of suggestibility are the passive dependent types who rely on the authority of the doctor.

Any medication prescribed by the physician carries with it the hope of fulfillment and protection. The medication takes on an emphatic projection of the doctor's personality and becomes in essence a symbol of support, of faith and even of spiritual wisdom. The actual chemical ingredient has as a hallmark of authenticity the faith in the doctor's judgment. There is then a skillful art in the balanced use of the placebo. It is not a means of deception, of fraud or misrepresentation; yet there can be but a delicate semantic nuance between its honest and dishonest use. When the placebo is used as a technique to disguise our scientific inadequacy, it is inexcusable. When drugs with a placebo effect are endowed with supernatural powers to compensate for our limitations their use is also inexcusable. The placebo can never be used to absolve the physician from the obligation to differentiate critically between the physical and emotional needs of the patient.

Moral values and their interpretation have insinuated themselves into the controversy for and against the use of the placebo. Lost in this controversy of morality were the specific needs and emotional equipment of the patient that dictated their use.

Illness is a threat to the integrity of the patient. The placebo as a specific form of therapy can serve as an additional tie between the doctor and the patient. The need for all therapy diminishes in direct proportion to the growing strength of that binding tie. Their strengthened relationship strips all therapy of affectations, pragmatic lies and purposeless distortions.

The art of therapy is a discriminating art. Factors apparently far removed from the etiology and diagnosis of disease determines therapeutic decisions. The art of treatment is intimately a part of the intricacies of the doctor-patient relationship. Drugs, especially the newer antibiotics, have become the property of both the doctor and the patient. When the sulfonamides and later the antibiotics were introduced, the press rapturously exalted their supernatural powers. These drugs were immediately considered as mystical throwbacks, first because their life-saving action was so poorly understood, and second because of their comparative rarity. Rarity again became an element exploited by those who ascribed to these drugs the title of "wonder." Their physiological action and specific characteristics to defend the body against the invasion of attacking organisms were lost in the excitement of the newness. Rather were the wonder-drugs considered as some magical derivative that had the specific power to exorcize all disease. Modern medicine temporarily reverted to the magical, mystic phase of pre-scientific medicine.

The sulfonamides and the antibiotics, by their very title of "wonder drugs" were given an extra mundane aura of magic. They gracefully took their place among the many drugs about which there still persists an inherited feeling of mysticism. Because the announcement of the discovery of the wonder drugs came to the laity at the same time that it came to the doctors, via press, radio and television, patients seemed to feel that they, too, had as great a proprietary right of possession of the drugs as did their contemporaries, the doctor; patients felt that unless the doctor actually discovered penicillin himself, he could not rightfully consider himself any greater expert in its administration than the patient himself. From then on, so-called qualified experts sprang up everywhere. Recovery from any illness and the correct pronouncement of the responsible drug fulfilled the basic requirements for admission to the lay society of therapists. For a long time after Fleming discovered penicillin the importance of its contribution was overshadowed by endless discussions as to whether it was to be called penicillin or penicillin. If I

recall correctly, a publication was released by a Committee of Eight which finally gave the news to the world, not of the great action of the drug, but of its correct and properly authorized pronunciation, penicillin.

Gleefully and rightfully the patient rubbed his hands in delight at the possibility that the physician would slowly become extinct. Dinner parties could always be rescued from boredom by a commiserating discussion of the dwindling need for doctors in the community. Here for the first time was an opportunity to volatilize their stored inner rages against the doctor, the golem of all illness. The immediate disappearance of all acute mastoid surgery was considered a kindness to mankind, but more important the first step in the total eradication of that parasitic vulture, the tonsil-snatching, septum-slicing butcher of butchers, the otolaryngologist.

Specialists in all other fields were being slowly eliminated, too, as the antibiotics were finding wider and wider use; in fact, the only field that seemed safe from the onslaught of the antibiotics was psychoanalysis, and it is now facetiously rumored that a potent antibiotic is in the making for covert homosexuality.

Chemotherapy and the antibiotics have taken a unique position in the important sociological relationship between the doctor and the patient. This position has as great a potential for good as it has for harm. The patient now demands and supports his demands for a specific drug, at a specific time, with a subtle threat. The special weapon, the ace in the hole to support his insistence is the "give or else law of no return." Either the doctor gives the antibiotic or the patient threatens to go somewhere else. Many patients have thus revolted from their previous position of subservience to enjoy new found control over the authority of the doctor. There was now a restoration of the balance of power which they had so reluctantly yielded to their physician. If I may be permitted the luxury of a pun, there is now an "intermycin intrigue" for the retention of the weapon of dominance.

Though this pressure may not always alter the integrity

or the therapeutic motivations of the doctor, it may alter his approach to the treatment of that particular patient. He recognizes that the patient will ultimately obtain the shot of wonder drug somewhere, and thus succumbs to the pressure of the patient's demands. Loss of therapeutic integrity is coincidental with the position he forfeits when he becomes a tool buffeted by the whim and fancy of medical ignorance. Having fallen into the pressure trap of the social use of the wonder drugs, he finds it difficult to extricate himself and is forced to perpetuate that initial error. This is the penalty for giving too great importance to these drugs and indoctrinating the patients in their miraculous misconceptions.

The demands for a rapid cure has forced the doctors into competition with each other and with themselves. Speed of cure has become the critical value in the expansive pride of possession of the patient for "their" pediatrician, "their" obstetrician, "their" nose and throat doctor. Speed of recovery always substantiates the magnified enthusiasm that makes their doctor "the chief of the department" or "the head of the hospital." To have less than "the chief" is a social disadvantage. An unimportant doctor and an unimportant disease can be a social handicap in the caste-like system of "illnesses." New therapy, even when scientifically unconfirmed, adds special distinction. Patients sometimes vie with each other for the special privilege of being an experimental "guinea pig" for a new antibiotic. There is nothing more destructive to the vanity of the patient than the doctor's casual statement that "the disease was relatively unimportant and would have gone away by itself." Recently it became a sign of social distinction to have had the first case of imported Asian flu in the community.

Antibiotics do not live by "molds" alone. The virus is a sly little fellow that has slowly insinuated himself into the practice of medicine as a subversive character. His position is made secure by those of us who exploit him to preserve the sanctity of our trade unionism. The virus is dead, long live the virus. Without him our inadequacies might be showing. The virus flourishes luxuriantly on the nutrient medium of ignorance. It can always be depended on to extricate us

from any untenable medical position. The virus is a comfortable refuge to explain the unexplainable. It seems hardly fair to use the antibiotics so injudiciously and promiscuously to destroy such a valuable ally. These two sociological elements, the virus and the antibiotics have joined forces and become a potent factor in our choice of therapy. Many years ago the magical power of the sulfonamides was said to cure the first virus I ever encountered. This was a six-day virus, a slow moving, unimpressive, undistinguished virus. Next came the forty-eight hour virus, cured dramatically with penicillin. The cure was fast, the drug was greater, the doctor was the greatest. We are now in the jet propelled two-hour virus phase, cured by "my doctor" with the triple acting wonder drug that contains "god all." Time records for cure have been broken with regularity. The cure now is so rapid that the patient barely has time to complain.

Many truths are interwoven in this apparent facetiousness.

Physicians and patients have been equally responsible for distorting the delicate balance of their vital relationship. Patients had been given remarkably little credit for their capacity to understand the complexities of their medical problems, but almost invariably this apparent lack of understanding was based on our inability to explain, rather than on their inability to comprehend. The laity is receptive to unconfused and undistorted medical information. They welcome precise explanations of our discriminating decisions for or against specific use of the sulfonamides and antibiotics. They now appreciate the disadvantages of the unbridled use of any drug, for they have learned, usually by sad experience, about the side effects and toxic reactions of these drugs. They have a new and profound respect for the danger in the promiscuous use of any drug. They have come to realize their inadequacy in guiding their own course of therapy.

Physicians everywhere are relinquishing their position as a drug giving cult. They are revolting against the social pressures of the patients who dictate their own antibiotic therapies; but with this revolt comes newer enlightenment and recognition that the emotional needs of patients cannot

be supported by the promiscuous use or abuse of antibiotic therapy.

Fear and anxiety is a constant in the equation of health and illness; the evaluation, therapy, and prognosis of all disease must always include its recognition. For there is but one yardstick and one criterion by which we can actually measure the intensity, the severity and duration of an illness. The touchstone that guides us is only the return of the individual to complete serviceability and productivity. Not until the individual is totally rehabilitated and returns to serve as a functioning part of his home, job and community can that individual be considered free of his disease. The cessation of a cough, the return of fever to normal, the normal sedimentation rate or electrocardiographic findings are never the critical criterion of the return to health. For many patients who are ostensibly cured fail to take their place in society because of the devastating fear that the illness may soon return. It matters little whether the individual is not serviceable because he has had a heart attack or is afraid that he will have one. It matters little if a man cannot function because he has a carcinoma of the larynx or lives in constant fear that he will have one. The devitalization by fear of impending disease can be infinitely greater than the disease itself. Rehabilitation, reestablishment of normal patterns of living are the only—yes, the only—way that we can determine the efficacy of our therapeutic approach. It becomes evident, therefore, that no diagnostic or therapeutic concept of medicine can be divorced from an understanding of the psychological overtones that invariably accompany every disease to which the body is heir.

This harrassed world carries with it newly conceived fears that destroy our complacency. The practice of medicine notes with growing concern the increase in the number of patients who are overwhelmed with fear and anxiety, often completely out of proportion to the severity of their illnesses. Minor, relatively insignificant disease seems to catapult patients into an emotional tailspin by the propulsive force of their unreasoning fears.

For many, this fear is far more destructive than disease itself. Anxiety seems to dominate their behavior during and sometimes long after their illnesses. This anxiety is not characteristic of any one sex, age, occupation, social and intellectual level, or ethnic, religious and geographic group. The timid, the stoic, the shy and the stalwart seem to be equally affected by an overlay of fear about the illnesses they have, or more often think they have. There may be variations of the intensity of the anxiety and the ease with which it can be alleviated, but no one appears to be completely free of it. Patients, children, adolescents and adults are afraid, just afraid! Their fears as well as their illnesses determine how quickly and how well they will be reestablished in their schools, jobs or homes.

Fear in itself is an illness. The fear that we physicians observe in our offices is actually a communicable disease. It is not transmitted by germs or by virus. It is transmitted by humans to humans, sometimes unwittingly, sometimes in error, and sometimes purposefully. For "Fear" is big business, and is often exploited by propaganda agencies under the guise of public medical education. Fear of all disease, fear of heart disease, fear of cancer, fear of tuberculosis, fear of arthritis, fear of cataclysmic destruction by atom bombs, fear of economic upheaval, and now fear of the consequences of smoking, all become a never-ending bombardment against our inner security. We have but to note the penalty paid by the public during their "education" about tobacco, Salk vaccine and Asian flu.

Fear is everywhere; it is all-pervasive; slowly, deliberately it seeps into our physical, emotional and spiritual fibers. To paraphrase Emerson, fear is a circle whose circumference is everywhere, and whose center is nowhere.

Fear is a force; fear is an illness; it can alter the destiny of those who, by concession to this fear, distort their behavior in response to it. It can play havoc with careers, social attainments, the relationship between husband and wife, and the relationship between parent and child.

Fear does not "stand up to be counted;" its greatest potency

lies in being hidden. Because it cannot be counted, it is not adequately charted in the statistics of the diseases of man, even though it ranks as one of the greatest threats to emotional and physical health.

Fear, the product of this harried, frenetic Twentieth Century is a sociological phenomenon. It activates many in their demand for miraculous therapy. Uncontrolled it destroys the rational relationship between doctors and their patients. Fear, as a disease and as an element in all disease, is readily communicated. Fear flourishes in epidemic form and slowly insinuates itself into every facet of our civilization; but like all other diseases, fear is vulnerable and yields to its own miracle drugs—hope and courage, psychologic education and freedom from ignorance and superstition. These, too, are wonder agents that are swinging the pendulum back to therapeutic sanity. The wide spectrum of the use of wonder drugs must include judicious understanding and critical therapeutic evaluation. Social pressures and prejudices must not dictate medical indications or specific choice of the "wonder drugs" if they are to survive in their rightful position as one of the greatest scientific contributions to mankind.

162 East Eightieth Street.

IN MEMORIEM

Gabriel Tucker, M.D.

1881-1958.

Dr. Gabriel Tucker, a native of Fairmont, W. Va., died at his home in Rosemont, Pa., April 18, 1958.

The degree of Doctor of Medicine was granted to Dr. Tucker by Jefferson Medical College in 1905, and he practiced in Pittsburgh and its environs until joining the Army Medical Corps in World War I, in which he served abroad at Base Hospital 126.

Widely known for his use of the bronchoscope and for his skill in the removal of lung cancers, he became Professor Emeritus of broncho-esophagology at the University of Pennsylvania Graduate School of Medicine and worked in the field as an associate of Dr. Chevalier Jackson in the first bronchoscopic clinic at Jefferson Medical College. Two years later he was named a charter member of the broncho-esophageal department upon the establishment of this clinic of the Pennsylvania Graduate School of Medicine.

The Gabriel Tucker Fund for the department of broncho-esophagology was established in 1949 at the Graduate School by an anonymous gift of \$200,000.

Together with Dr. Chevalier Jackson he conducted the first course in laryngeal surgery in the European medical schools.

Dr. Tucker was a member of the American Academy of Ophthalmology and Otolaryngology, from which he received the Honor Award in 1955; he was a past president of the American Laryngological Association and past secretary and chairman of the Section on Laryngology, Rhinology and Otology, of the American Medical Association, and was a Fellow of the American College of Surgeons.

Surviving are his widow, three sons and four grand children.

SUBCOMMITTEE ON HEARING IN CHILDREN.

The American Academy of Ophthalmology and Otolaryngology, through its Subcommittee on Hearing in Children of the Committee on Conservation of Hearing, has been conducting a long-term nationwide study of problems relating to the conservation of hearing in children. The specific aims are to develop the most efficient case-finding methods and to use these methods in estimating the magnitude of the problem in the country; to study state laws and review current practices and facilities for rehabilitation of hearing impaired children; to help develop methods for medical and surgical rehabilitation standards; and ultimately to use the Subcommittee findings in assisting professional workers to improve and enhance programs in hearing loss.

In the second year of operations, a full-time Executive Director has been engaged, and offices established at the Graduate School of Public Health, University of Pittsburgh. An initial study is being conducted in Pittsburgh to identify early medical signs and symptoms which may indicate danger of hearing impairment, to measure the psychological, social and other effects of such impairment and to develop efficient and economical methods for the testing of hearing in children. The Pittsburgh study is a cooperative effort among the following: The Subcommittee on Hearing in Children, the Graduate School of Public Health and the School of Medicine of the University of Pittsburgh, the Pittsburgh Board of Public Education, and the Allegheny County Department of Health.

The members of the Subcommittee on Hearing in Children are: Dr. John E. Bordley, Baltimore; Dr. Victor Goodhill, Los Angeles; Dr. Hollie E. McHugh, Montreal; Dr. S. Richard Silverman, St. Louis; and Dr. Raymond E. Jordan, (Chairman) Pittsburgh. An advisory committee of consultants from the University of Pittsburgh includes Dr. Samuel M. Wishik, Dr. Leo G. Doerfler, and Dr. Isidore Altman. Grants from the United States Children's Bureau through the Pennsylvania Department of Health and from the National Institutes of Health are providing financial support.

**REINE HUMBIRD MYERS FELLOWSHIPS IN
AUDIOLOGY AND HEARING SOCIETY
ADMINISTRATION.**

The American Hearing Society and its member agency, the St. Paul Hearing Society, announce two Reine Humbird Myers Fellowships for a two-year program of graduate study at Northwestern University, annual stipend \$3,000, for students interested in a career combining the professional and executive responsibilities of Hearing Society work.

Fellowships are open only to students who are acceptable to the Graduate School of Northwestern University, and who intend to take key positions in local Hearing Societies upon completion of the Fellowship training in Administrative Practices, Agency Procedures, Clinical Audiology and Speech Pathology.

The program covers two calendar years. The sequence of study will ordinarily lead to the Master of Arts degree. Studies include courses in phonetics, basic audiometric techniques, speechreading, auditory training, and speech development, psychology of deafness, community programs in audiology, hearing aids and their selection, advanced audiometry, anatomy of the hearing and speech mechanisms, principles of speech correction, and elective areas. The program also includes courses in social work, plus clinical experience and field activities.

The resources of the Graduate School of Northwestern University are combined with the educational facilities in social work found in the Chicago area. Special opportunities for practical experience are available at the Chicago Hearing Society and in clinics maintained by Northwestern University.

Each candidate must submit to the American Hearing Society: (a) transcripts of his academic record; (b) a personal statement describing his background and expressing his professional aims and goals; and (c) names of five references, including at least one college instructor and one employer or work supervisor. The candidate must also apply

for admission to the Graduate School of Northwestern University, and must notify the School of Speech at the University that he is seeking a Reine Humbird Myers Fellowship.

INSTITUTE ON INDUSTRIAL DEAFNESS.

Colby College, Waterville, Maine, presents the Sixth Annual Institute on Industrial Deafness, August 11-20 inclusive. Please note that the course has been extended for three days in order to include engineering for noise control. Its objective will be to train physicians interested in the problem; nurses, plant engineers and others in initiating and conducting hearing conservation programs in noisy industries. The course includes basic otology, audiometry, noise measurement, ear protection and methods of noise control. Class is limited to approximately twenty participants.

The fee for the course is \$250 and includes tuition, room and board. The first week will constitute a complete course for doctors and nurses, and the reduced fee for this will be \$200. Application should be made to Mr. William A. Macomber, Colby College, Waterville, Maine.

DIRECTORY OF OTOLARYNGOLOGIC SOCIETIES.

(Secretaries of the various societies are requested to keep this information up to date).

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. Erling W. Hansen, 90 So. Ninth St., Minneapolis, Minn.
Executive Secretary: Dr. William L. Benedict, Mayo Clinic, Rochester,
Minn.
Meeting: Palmer House, Chicago, Ill.

AMERICAN BOARD OF OTOLARYNGOLOGY.

Meeting: Palmer House, Chicago, Ill.

AMERICAN BRONCHO-ESOPHAEOLOGICAL ASSOCIATION.

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phia, Pa.
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AMERICAN LARYNGOLOGICAL ASSOCIATION.

President: Dr. Harry P. Schenk, 326 S. 19th St., Philadelphia 3, Pa.
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AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

President: Dr. Gordon Hoople, 1100 E. Genesee St., Syracuse 10, N. Y.
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Secretary: Dr. C. Stewart Nash, 700 Medical Arts Bldg., Rochester 7,
N. Y.
Place: The Homstead, Hot Springs, Va., March, 1959.

AMERICAN MEDICAL ASSOCIATION, SECTION ON LARYNGOLOGY, OTOTOLOGY AND RHINOLOGY.

Chairman: Dr. Gordon D. Hoople, Syracuse, N. Y.
Vice-Chairman: Dr. Kenneth L. Craft, Indianapolis, Ind.
Secretary: Dr. Hugh A. Kuhn, Hammond, Ind.
Representative to Scientific Exhibit: Walter Heck, M.D., San Francisco,
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Section Delegate: Gordon Harkness, M.D., Davenport, Iowa.
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AMERICAN OTOLOGICAL SOCIETY, INC.

President: Dr. Moses Lurie, Boston, Mass.

President-Elect: Dr. R. C. Martin.

Secretary: Dr. Lawrence R. Boles, University Hospitals, Minneapolis 14, Minn.

Place: The Homestead, Hot Springs, Va., 1959.

AMERICAN OTORRHINOLOGIC SOCIETY FOR THE ADVANCEMENT OF PLASTIC AND RECONSTRUCTIVE SURGERY.

President: Dr. Joseph Gilbert, 111 E. 61st St., New York, N. Y.

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Treasurer: Dr. Arnold L. Caron, 36 Pleasant St., Worcester, Mass.

AMERICAN RHINOLOGIC SOCIETY.

President: Dr. Russell I. Williams, 408 Hynds Bldg., Cheyenne, Wyo.

Secretary: Dr. Robert M. Hansen, 1735 No. Wheeler Ave., Portland, Ore.

Annual Clinical Session: Illinois Masonic Hospital, Chicago, Ill., October, 1958.

Annual Meeting: October, 1958, Chicago, Ill. (Definite time and place to be announced later).

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Meeting: New York, July 16, 1958; December 3, 1958, place to be announced.

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Annual Meeting: Palmer House, Chicago, Ill., October 16-17, 1958.

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Secretary:
Meeting:

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Secretary-Treasurer: Dr. H. Carlton Howard.
Meeting quarterly (March, May, October and December), on the second Thursday of the month, 6:30 P.M. at Urmey Hotel, Miami.

INTERNATIONAL BRONCHESOPHAGOLOGICAL SOCIETY.

President: Dr. Jo Ono, Tokyo, Japan.
Secretary: Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40, Pa., U. S. A.
Meeting: Seventh International Congress of Bronchoesophagology, Kyoto, Japan, September, 1958.

**KANSAS CITY SOCIETY OF OTOLARYNGOLOGY
AND OPHTHALMOLOGY.**

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Chairman of Otolaryngology Section: Dr. Howard G. Gottschalk.
Secretary of Otolaryngology Section: Dr. Robert W. Godwin.
Place: Los Angeles County Medical Association Bldg., 1925 Wilshire
Blvd., Los Angeles, Calif.
Time: 6:30 P. M. last Monday of each month from September to June,
inclusive—Otolaryngology Section. 6:30, first Thursday of each month
from September to June, inclusive—Ophthalmology Section.

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Meeting: Edgewater Gulf Hotel, Edgewater Park, Miss., May 15-16, 1959.

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AND OTOLARYNGOLOGY.**

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Nose and Throat Hospital.

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Meeting:

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Meeting: Palmer House, Chicago, Ill.

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Meeting:

PAN AMERICAN ASSOCIATION OF OTO-RHINO-LARYNGOLOGY AND BRONCHO-ESOPHAGOLOGY.

President: Dr. Jose Gros, Havana, Cuba.
Executive Secretary: Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40, Pa., U. S. A.
Meeting: Sixth Pan American Congress of Oto-Rhino-Laryngology and Broncho-Esophagology.
Time and Place: Brazil, 1958.

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Meeting: Palmer House, Chicago, Ill.

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Meeting:

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